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The GALE ENCYCLOPEDIA of ALTERNATIVE MEDICINE

THIRD EDITION

VOLUME 2

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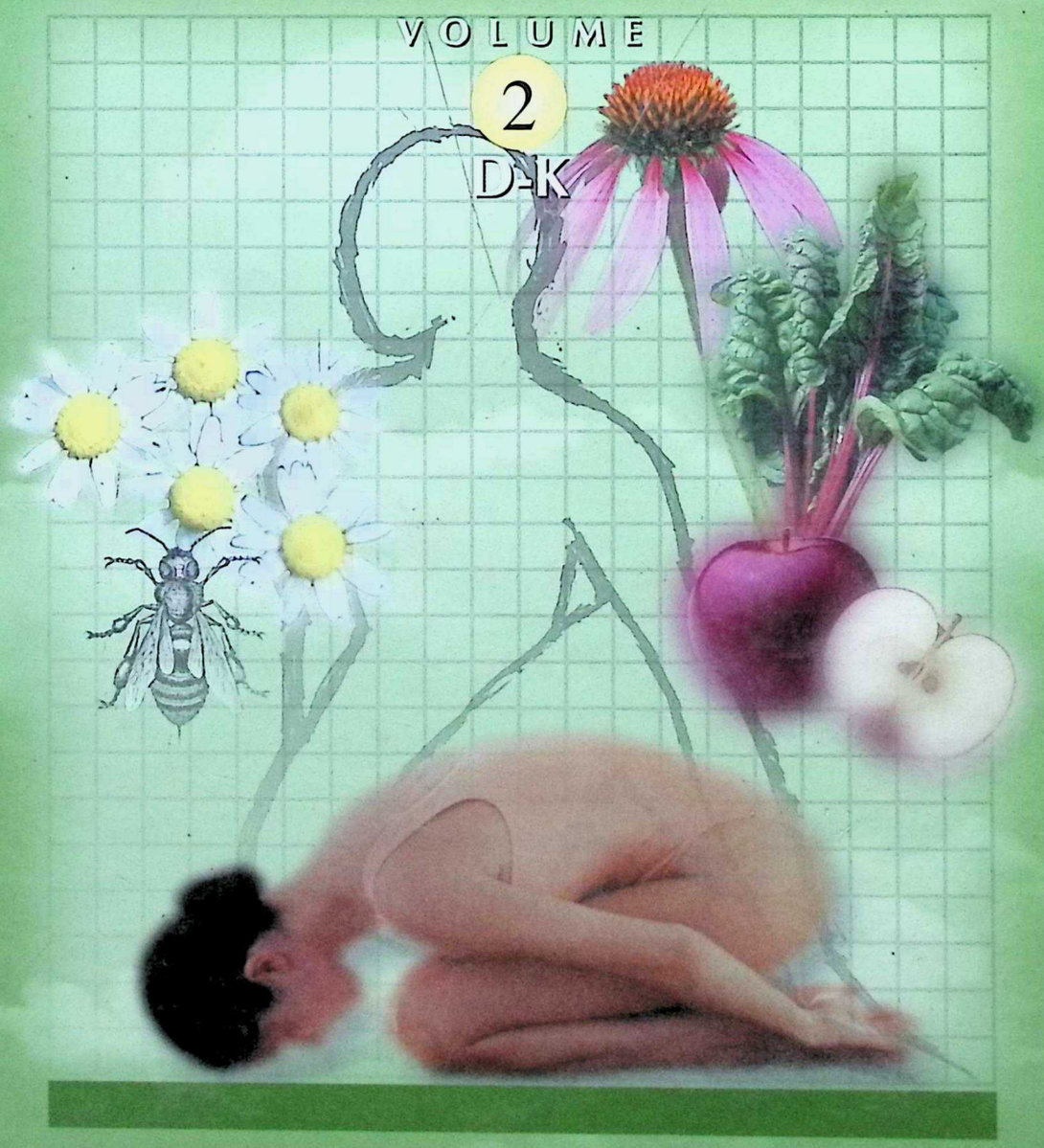

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लेखक Fundukian, Laurie T.
शीर्षक The gale encyclopedia of ALTernative medicine

दिनांक	सदस्य संख्या	दिनांक	सदस्य संख्या

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Stock Verification-2024

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Gale Encyclopedia of Alternative Medicine, Third Edition

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Imaging: Lezlie Light

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615.503
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Library of Congress Cataloging-in-Publication Data

The Gale encyclopedia of alternative medicine, 3rd ed. / edited by Laurie J. Fundukian, editor.
p. cm. --
Includes bibliographical references and index.
ISBN 978-1-4144-4872-5 (set) -- ISBN 978-1-4144-4873-2 (vol. 1) -- ISBN 978-1-4144-4874-9 (vol. 2) -- ISBN 978-1-4144-4875-6 (vol. 3) -- ISBN 978-1-4144-4876-3 (vol. 4)
1. Alternative medicine--Encyclopedias. I. Fundukian, Laurie J. II. Title: Encyclopedia of alternative medicine.
[DNLM: 1. Complementary Therapies--Encyclopedias--English. 2. Internal Medicine--Encyclopedias--English. WB 13 G1508 2009]

R733.G34 2009
615.5'03--dc22 2008016097

Gale
27500 Drake Rd.
Farmington Hills, MI, 48331-3535

ISBN-13: 978-1-4144-4872-5 (set) ISBN-10: 1-4144-4872-4 (set)
ISBN-13: 978-1-4144-4873-2 (vol. 1) ISBN-10: 1-4144-4873-2 (vol. 1)
ISBN-13: 978-1-4144-4874-9 (vol. 2) ISBN-10: 1-4144-4874-0 (vol. 2)
ISBN-13: 978-1-4144-4875-6 (vol. 3) ISBN-10: 1-4144-4875-9 (vol. 3)
ISBN-13: 978-1-4144-4876-3 (vol. 4) ISBN-10: 1-4144-4876-7 (vol. 4)

This title is also available as an e-book.
ISBN-13: 978-1-4144-4877-0 ISBN-10: 1-4144-4877-5
Contact your Gale, a part of Cengage Learning sales representative for ordering information.

Printed in China
1 2 3 4 5 6 7 12 11 10 09 08

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PLEASE READ—IMPORTANT INFORMATION

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INTRODUCTION

The Gale Encyclopedia of Alternative Medicine (GEAM) is a one-stop source for alternative medical information that covers complementary therapies, herbs and remedies, and common medical diseases and conditions. It avoids medical jargon when possible, making it easier for the layperson to use. *The Gale Encyclopedia of Alternative Medicine* presents authoritative, balanced information and is more comprehensive than single-volume family medical guides.

Scope

More than 800 full-length articles are included in *The Gale Encyclopedia of Alternative Medicine*. Many prominent figures are highlighted as sidebar biographies that accompany the therapy entries. Articles follow a standardized format that provides information at a glance. Rubrics include:

Therapies

- Origins
- Benefits
- Description
- Preparations
- Precautions
- Side effects
- Research and general acceptance
- Resources
- Key terms

Herbs/remedies

- General use
- Preparations
- Precautions
- Side effects
- Interactions
- Resources
- Key terms

Diseases/conditions

- Definition
- Description
- Causes and symptoms
- Diagnosis
- Treatment
- Allopathic treatment
- Expected results
- Prevention
- Resources
- Key terms

Inclusion criteria

A preliminary list of therapies, herbs, remedies, diseases, and conditions was compiled from a wide variety of sources, including professional medical guides and textbooks, as well as consumer guides and encyclopedias. The advisory board, made up of three medical and alternative healthcare experts, evaluated the topics and made suggestions for inclusion. Final selection of topics to include was made by the medical advisors in conjunction with Gale editors.

About the Contributors

The essays were compiled by experienced medical writers, including alternative healthcare practitioners and educators, pharmacists, nurses, and other complementary healthcare professionals. *GEAM* medical advisors reviewed more than 95% of the completed essays to insure that they are appropriate, up-to-date, and medically accurate.

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How to Use this Book

The Gale Encyclopedia of Alternative Medicine has been designed with ready reference in mind:

- Straight **alphabetical arrangement** allows users to locate information quickly.
- Bold faced terms function as *print hyperlinks* that point the reader to related entries in the encyclopedia.
- A list of **key terms** is provided where appropriate to define unfamiliar words or concepts used within the context of the essay. Additional terms may be found in the **glossary**.
- **Cross-references** placed throughout the encyclopedia direct readers to where information on subjects without their own entries can be found. Synonyms are also cross-referenced.
- A **Resources section** directs users to sources of further complementary medical information.
- An appendix of alternative medical organizations is arranged by type of therapy and includes valuable **contact information**.
- A comprehensive **general index** allows users to easily target detailed aspects of any topic, including Latin names.

Graphics

The Gale Encyclopedia of Alternative Medicine is enhanced with more than 400 images, including photos, tables, and customized line drawings.

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An advisory board made up of prominent individuals from complementary medical communities provided invaluable assistance in the formulation of this encyclopedia. They defined the scope of coverage and reviewed individual entries for accuracy and accessibility. We would therefore like to express our appreciation to them:

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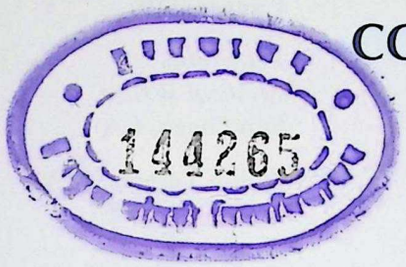

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Damiana

Description

Damiana, a member of the Turneraceae family, is an aromatic shrub with small yellow flowers that grows on dry, sunny, rocky hillsides in south Texas, Southern California, Mexico, and Central America. The two species used in herbal healing, both of which are referred to as damiana, are *Turnera aphrodisiaca* and *Turnera diffusa*. Damiana usually grows to a height of about 24 in (60 cm). Its pale green leaves, which turn yellow-brown when dried, are 0.5–1 in (15–25 mm) long and quite narrow. They have serrated (jagged) edges. The leaves and sometimes the stems of the plant have medicinal uses. Other names for damiana include old woman's broom, Mexican damiana, pastorata, hierba del venado, oreganello, and the bourrique.

General use

Damiana affects primarily the urinary and reproductive systems. It has been used as an aphrodisiac and to boost sexual potency in men by the native peoples of Mexico, including the Mayan Indians, for thousands of years. It is said to act as a sexual stimulant and produce a feeling of general well being. Damiana is sometimes used in men to treat spermatorrhea, premature ejaculation, sexual sluggishness, and prostate complaints. It is often used in combination with other herbs to treat **impotence**.

During the twentieth century, damiana shifted from being primarily a male sexual remedy to also being prescribed for women. In women it is used to treat painful **menstruation**, **menopause** disorders, and headaches caused by menstruation.

Both men and women use damiana to relieve **anxiety**, nervousness, and mild **depression**, especially if these symptoms have a sexual component. The herb is also used as a general tonic to improve wellness. As a general tonic it is said to act as a stimulant, improve circulation, and regulate hormonal activity. Some herbal practitioners use it as a diuretic. Damiana tonic should be used moderately and not be taken on a long-term basis.

Damiana has been used traditionally to improve digestion and to treat **constipation**, as in large doses it has a mild laxative effect. Other uses include treatment of **asthma**, **cough** and flu, and nephritis. During the 1960s, damiana was touted as a recreational drug. Some users claimed that damiana produced a mild "high" or hallucinogenic effect similar to **marijuana** that lasts an hour to an hour and a half.

In addition to its medicinal uses, damiana is used in Mexico to flavor liqueurs, tea, and other beverages and foods. It tastes slightly bitter, and the leaves have a strong resinous aroma when crushed.

Despite its long history and frequent use in many different cultures, scientists as of 2008 were unable to isolate any active ingredients that would account for damiana's aphrodisiac, stimulant, or hallucinogenic properties. The herb contains a volatile oil that may mildly irritate the genitourinary system. This volatile oil may be at the root of damiana's reputation as an aphrodisiac.

The German Federal Health Agency's Commission E, which was established in 1978 to independently review and evaluate scientific literature and case studies pertaining to herb and plant medications, found no proof that damiana acts either as a sexual stimulant or as a hallucinogen. That said, they found no proof that damiana is likely to cause harm. A 1999 study on rats conducted in Italy found that extracts of *Turnera diffusa* had no effect on sexually potent rats, but it did increase the performance of sexually sluggish or impotent rats. There have been no clinical trials involving humans. As of 2008, the safety and efficacy of this herb had not been evaluated by the United States Food and Drug Administration (FDA).

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Damiana has been used as an aphrodisiac and to boost sexual potency in men by the native peoples of Mexico, including the Mayan Indians, for thousands of years. *(© Geoffrey Kidd / Alamy)*

KEY TERMS

Aphrodisiac—Anything that arouses or increases sexual desire.

Diuretic—Any substance that increases the production of urine.

Hallucinogen—A substance that causes the perception of a stimulus or object when it is not really present.

Nephritis—An inflammation or irritation of the kidney.

Spermatorrhea—Involuntary discharge of semen without an orgasm occurring; sperm leakage.

Tincture—An alcohol-based extract prepared by soaking plant parts.

Preparations

The leaves and occasionally the stems of damiana are used medicinally. They are normally harvested while the plant is in flower and then are dried. Dried leaves turn a yellow-brown color and may be powdered, used in capsules, or steeped in water or alcohol. Damiana is always used internally, never topically.

Traditionally, damiana has been prepared as a tea or infusion. Although folk recipes vary, generally about 1 cup (250 ml) of boiling water is added to 1/2 cup (1 g) of dried leaves, and allowed to steep about 15 minutes. One cup of this infusion is drunk two to three times daily. This infusion is slightly bitter and has an astringent quality.

Damiana is also available as a tincture of which 1–3 ml is taken two or three times a day. If taken in capsule or tablet form, 3–8 g twice a day may be taken. Damiana is also available in concentrated drops. Damiana is often used in conjunction with other herbs having similar properties, and it is often found as an ingredient in herbal mixtures or formulas. Their manufacture and purity is not regulated by the FDA.

Precautions

Scientific evidence indicates that damiana is one of the safest substances commonly taken for sexual enhancement. It has a long history of traditional medicinal and food use with no harmful consequences reported. It is believed to be unlikely to cause harm or have negative side effects when taken in the designated doses. However, individuals who have diabetes, a history of **breast cancer**, **bipolar disorder**, **schizophrenia**, Alzheimer's disease, or Parkinson's disease should consult a physician before taking this herb. No rigorous scientific studies as of 2008 have examined the effects of long-term use of damiana.

Side effects

Large doses of damiana may cause loose stools because of the herb's laxative properties. Occasional allergic reactions have been reported, but otherwise, no unwanted side effects have been documented.

Interactions

People who are taking pharmaceutical drugs to control blood sugar levels should consult their healthcare provider before starting damiana, since the herb may interact with these drugs. Damiana is often used in combination with other herbs without any negative effects.

Resources

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Alternative Medicine Foundation, PO Box 60016, Potomac, MD, 20859, (301) 340-1960. http://www.amfoundation.org.

Centre for International Ethnomedicinal Education and Research (CIEER) http://www.cieer.org.

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Dance therapy

Definition

Dance therapy is a type of **psychotherapy** that uses movement to further the social, cognitive, emotional, and physical development of the individual. Dance therapists work with people who have many kinds of emotional problems, intellectual deficits, and life-threatening illnesses. They are employed in psychiatric hospitals, day care centers, mental health centers, prisons, special schools, and private practice. They work with people of all ages in both group and individual therapy. Some also engage in research.

Dance therapists try to help people develop communication skills, a positive self-image, and emotional stability.

Origins

Dance therapy began as a profession in the 1940s with the work of Marian Chace. A modern dancer, she began teaching dance after ending her career with the Denishawn Dance Company in 1930. In her classes, she noticed that some of her students were more interested in the emotions they expressed while dancing (loneliness, shyness, fear, etc.) than the mechanics of the moves. She began encouraging them by emphasizing more freedom of movement rather than technique.

In time, doctors in the community started sending her patients. They included antisocial children, people with movement problems, and those with psychiatric illnesses. Eventually, Chace became part of the staff of the Red Cross at St. Elizabeth's Hospital. She was the first dance therapist employed in a formal position by the federal government. Chace worked with the emotionally troubled patients at St. Elizabeth's and tried to get them to reach out to others through dance. Some of them were schizophrenics and others were former servicemen suffering from **post-traumatic stress disorder**. Success for these patients meant being able to participate with their class in moving to rhythmic music. "This rhythmic action in unison with others results in a feeling of well-being, **relaxation**, and good fellowship," Chace said.

Dance therapy in a mental health unit. *(© Photo Researchers, Inc. Reproduced by permission.)*

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KEY TERMS

Authentic movement—A type of movement that is influenced heavily by Jungian analysis, and works by analyzing the internal images of the patient. Patients are also urged to dance only when they feel the "impulse" to move.

Freudian analysis—A type of psychological treatment where the therapist seeks to help the patient resolve conflicts and traumas buried in the subconscious.

Jungian analysis—A method of psychological treatment where the patient strives to understand the internal, often mythic images in his or her thoughts and dreams.

Psychotherapy—A medical treatment that seeks to resolve psychological traumas and conflicts, often by discussing them and emotionally reliving difficult events in the past.

Test anxiety—A name for the stress and anxiousness that commonly occur in students before they take exams.

Chace eventually studied at the Washington School of Psychiatry and began making treatment decisions about her patients along with other members of the St. Elizabeth's medical team. Her work attracted many followers and the first dance therapy interns began learning and teaching dance therapy at St. Elizabeth's in the 1950s.

Other dancers also began using dance therapy in the 1940s to help people feel more comfortable with themselves and their bodies. These dancers included Trudi Schoop and Mary Whitehouse. Whitehouse later became a Jungian analyst and an influential member of the dance therapy community. She developed a process called "movement in-depth," an extension of her understanding of dance, movement, and depth psychology. She helped found the contemporary movement practice called "authentic movement." In this type of movement, founded on the principles of Jungian analysis, patients dance out their feelings about an internal image, often one that can help them understand their past or their current life struggles. One of Whitehead's students, Janet Alder furthered Whitehead's work in authentic movement by establishing the Mary Starks Whitehouse Institute in 1981.

In 1966, dance therapy became formally organized and recognized when the American Dance Therapy Association (ADTA) was formed.

Benefits

Dance therapy can be helpful to a wide range of patients—from psychiatric patients to those with **cancer** to lonely elderly people. Dance therapy is often an easy way for a person to express emotions, even when his or her experience is so traumatic he or she can not talk about it. It is frequently used with rape victims and survivors of sexual abuse and incest. It can also help people with physical deficits improve their self-esteem and learn balance and coordination.

Dance therapists also work with people who have chronic illnesses and life-threatening diseases to help them deal with **pain**, fear of death, and changes in their body image. Many people with such illnesses find dance therapy classes to be a way to relax, get away from their pain and emotional difficulties for a while, and express feelings about taboo subjects (such as impending death).

Dance therapy is suitable even for people who are not accomplished dancers, and may even be good for those who are clumsy on the dance floor. The emphasis in dance therapy is on free movement, not restrictive steps, and expressing one's true emotions. Children who cannot master difficult dances or can not sit still for traditional psychotherapy often benefit from free-flowing dance therapy. Even older people who cannot move well or are confined to wheelchairs can participate in dance therapy. All they need to do is move in some way to the rhythm of the music.

Dance therapy can be useful in a one-on-one situation, where the therapist works with only one patient to provide a safe place to express emotions. Group classes can help provide emotional support, enhanced communication skills, and appropriate physical boundaries (a skill that is vital for sexual abuse victims).

Description

There are currently more than 1,200 dance therapists in 46 states in the United Sates and in 29 foreign countries. Like other mental health professionals, they use a wide range of techniques to help their patients. Some of the major "schools of thought" in dance therapy include the Freudian approach, Jungian technique, and object relations orientation. Many therapists, however, do not ascribe to just one school, but use techniques from various types of dance therapy.

The authentic movement technique is derived from the Jungian method of analysis in which people work with recurring images in their thoughts or dreams to derive meaning in their life. Instead of asking the patient to dance out certain emotions, the therapist

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instructs the patient to move when he or she feels "the inner impulse." The moves are directed by the patient and the therapist is a noncritical witness to the movement. The moves are supposed to emerge from a deep level within the patient.

In Freudian technique, dance therapists work with patients to uncover feelings hidden deep in the subconscious by expressing those feelings through dance.

In object relations technique, the therapist often helps the patient examine problems in his or her life by considering the primary initial relationship with the parents. Emotions are expressed in a concrete, physical way. For instance, a patient would work out his fears of abandonment by repeatedly coming close to and dancing at a distance from the therapist.

Dance therapists sometimes use other types of therapy along with dance, such as art or drama. Therapists also discuss what happens during a dancing session by spending time in "talk therapy." Dance therapists use visualizations during sessions, too. For example, the therapist might instruct patients to imagine they are on a beautiful, peaceful beach as they dance.

In one frequently used technique, the therapist mirrors the movements of the patient as he or she expresses important emotions. This is especially powerful in private one-on-one therapy. It is thought that this device provides a sense of safety and validates the patient's emotions.

The underlying premise of dance therapy is that when people dance, they are expressing highly significant emotions. A fist thrust out in anger into the air or a head bent in shame has deep significance to a dance therapist. Through dance therapy, the theory goes, patients are able to more easily express painful, frightening emotions, and can progress from there. After experiencing dance therapy, they can talk about their feelings more freely and tear down the barriers they have erected between themselves and other people. The hope is that eventually they can go on to live more psychologically healthy lives.

Preparations

People who want to use dance therapy should find a qualified therapist. The ADTA provides lists of qualified therapists. The person should begin dance therapy with an open mind and a willingness to participate so he or she can get the most benefit.

Precautions

A qualified dance therapist should have completed a graduate program in dance therapy approved by the ADTA and should be registered with the ADTA. He or she should not just be a dancer, but should also have extensive training in psychology.

Side effects

No known side effects.

Research and general acceptance

Dance therapy was once dismissed as simply an ineffective, "feel good" treatment, but it is now more respected. Many research studies have proven that dance therapy can be an effective tool to help people overcome psychological problems.

In a 1993 study, older people with cognitive deficits showed that dance therapy could significantly increase their functional abilities. Patients improved their balance, rhythmic discrimination, mood, and social interaction.

In 1999, a pilot study of 21 university students showed that those who took a series of four to five group dance therapy sessions in a period of two weeks significantly reduced their test **anxiety** as measured by a well-known exam called the Test Anxiety Inventory. Afterwards, the subjects reported that their dance movement experience was positive and provided them with psychological insight. The researchers concluded that dance therapy could be a viable method of treatment for students who have overwhelming test anxiety, and should be researched further.

In another 1999 study presented at the ADTA national conference in November 1999, dance therapist Donna Newman-Bluestein reported success in using techniques of dance therapy with cardiac patients. In a **stress** reduction class, health professionals used dance therapy methods to teach body awareness, relaxation, self-expression, creativity, and empathy. According to Newman-Bluestein, the dance therapy techniques helped the patients deal with such stressful emotions as anger, increased their self-awareness, made them more relaxed, and helped them adjust emotionally to having **heart disease**.

Training and certification

Dance therapists should have dance experience and a liberal arts background with coursework in psychology for their undergraduate degree. Professional dance therapy training takes place on the graduate level. A qualified dance therapist has received a graduate degree from a school approved by the ADTA, or has a master's degree in dance or psychology and has taken additional dance therapy credits.

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After graduation, dance therapists can become registered with the ADTA, meaning that they are qualified to practice. After two years they may receive an additional recognition when they become an Academy of Dance Therapist Registered. They can then teach dance therapy and supervise interns.

Dance therapists can also obtain psychological credentials by taking a test and becoming registered by the National Board for Certified Counselors, Inc.

Resources

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American Dance Therapy Association. (410) 997-4040. info@adta.org. http://www.adta.org.

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Dandelion

Description

Dandelion (*Taraxacum officinale*) is a common meadow herb of the Asteraceae or sunflower family. There are about 100 species of dandelion, and all are beneficial. This sun-loving beauty is a native of Greece, naturalized in temperate regions throughout the world, and familiar to nearly everyone. The perennial dandelion grows freely wherever it can find a bit of earth and a place in the sun. Dandelion's nutritive and medicinal qualities have been known for centuries.

Dandelion's common name is derived from the French *dent de lion*, a reference to the irregular and jagged margins of the lance-shaped leaves. There are numerous folk names for this widely-used herb. They include pissabed, Irish daisy, blow ball, lion's tooth, bitterwort, wild endive, priest's crown, doonhead-clock, yellow gowan, puffball, clock flower, swine snort, fortune-teller, and cankerwort. The generic name is thought to be derived from the Greek words *taraxos*, meaning disorder, and *akos*, meaning remedy. Another possible derivation is from the Persian *tark hashgun*, meaning wild endive, one of dandelion's common names. The specific designation *officinale* indicates that this herb was officially listed as a medicinal. Dandelion held a place in the United States *National Formulary* from 1888 until 1965, and the dried root of dandelion is listed in the *United States Pharmacopoeia* (USP).

Dandelion may be distinguished from other similar-looking herbs by the hollow, leafless flower stems that contain a bitter milky-white liquid also found in the root and leaves. The dark green dandelion leaves, with their irregular, deeply jagged margins, have a distinctive hairless mid-rib. The leaves are arranged in a rosette pattern, and may grow to 1.5 ft (45.7 cm) in length. They have a lovely magenta tint that extends up along the inner rib of the stalkless leaf. When the plant is used as a dye, it yields this purple hue. Dandelion blossoms are singular and round, with compact golden-yellow petals. They bloom from early spring until well into autumn atop hollow stalks that may reach from 4–8 in (10.2–20.3 cm) tall. The golden blossoms yield a pale yellow dye for wool. After flowering, dandelion develops a round cluster of achenes, or seed cases. As many as 200 of these narrow seed cases, each with a single seed, form the characteristic puffball. Each achene is topped with a white, feathery tuft to carry it on the breeze. Dandelion's tap root may grow fat, and reach as deep as 1.5 ft (45.7 cm) in loose soil. The root has numerous hairy rootlets. Dandelion is a hardy herb and will regrow from root parts left in the ground during harvest.

General use

Dandelion has a long history of folk use. Early colonists brought the herb to North America. The native people soon recognized the value of the herb and sought it out for its medical and nutritious benefits. The entire plant is important as a general tonic, particularly as a liver tonic. It may be taken as an infusion of the leaf, a juice extraction, a root decoction, or a tincture. Fresh

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KEY TERMS

Achene—Any small, dry, hard seed case or fruit that does not split open at maturity to discharge the seed. Dandelion seeds are held inside achenes.

Cholagogue—A substance that stimulates the flow of bile.

Infusion—The most potent form of extraction of an herb into water. Infusions are steeped for a longer period of time than teas.

Tincture—The extraction of a herb into an alcohol solution for either internal or external use.

leaves may be added to salads or cooked as a potherb. The juice extracted from the stem and leaf is the most potent part of the plant for medicinal purposes. It has been used to eradicate **warts** and soothe **calluses**, bee **stings**, or sores. Infusions of dandelion blossoms have been used as a beautifying facial, refreshing the skin.

Dandelion is a nutritive herb rich in **potassium**, calicum, and **lecithin**, with **iron**, **magnesium**, **niacin**, **phosphorus**, proteins, silicon, **boron**, and **zinc**. Dandelion provides several B vitamins along with vitamins C and E as well as vitamin P. Chemical constituents in the leaf include bitter glycosides, **carotenoids**, terpenoids, **choline**, potassium salts, iron, and other minerals. The root also has bitter glycosides, tannins, triterpenes, sterols, volatile oil, choline, asparagin, and inulin.

Many herbalists regard the dandelion as an effective treatment for liver disease, useful even in such extreme cases as **cirrhosis**. It cleanses the bloodstream and increases bile production, and is a good remedy for gall bladder problems as well. The herb is also a boon to such other internal organs as the pancreas, kidneys, stomach, and spleen. The dried leaf, taken as a tea, is used as a mild laxative to relieve **constipation**. Dandelion leaf is also a good natural source of potassium, and will replenish any potassium that may be lost due to the herb's diuretic action on the kidneys. This characteristic makes dandelion a safe diuretic in cases of water retention due to heart problems.The herb is useful in cases of **anemia** and **hepatitis**, and may lower elevated blood pressure. Dandelion may also provide relief for rheumatism and arthritis. Dandelion therapy, consisting of therapeutic doses of dandelion preparations taken over time, may help reduce stiffness and increase mobility in situations of chronic degenerative joint disease. The root, dried and minced, can be used as a coffee substitute, sometimes combined with roasted acorns and rye.

Preparations

All parts of the dandelion have culinary and medicinal value. It is best to harvest fresh young dandelion leaves in the spring. The small, young leaves are less bitter, and may be eaten uncooked in salads. Larger leaves can be lightly steamed to reduce bitterness. Leaves gathered in the fall are naturally less bitter. Dandelion blossoms, traditionally used in wine making, may be gathered throughout the flowering season. The deep, fleshy taproot should be gathered in the fall. It takes careful digging and loosening to extract the root intact, although any root parts left in the soil will eventually produce another plant. The root should be washed. Thicker roots should be sliced down their length to facilitate drying. The pieces should be spread out on a paper-lined tray in a light, airy room out of direct sunlight and stored in tightly sealed dark glass containers. Dried dandelion root may be somewhat less potent than the fresh root.

Leaf infusion: Place 2 oz of fresh dandelion leaf, less if dried, in a warmed glass container. Bring 2.5 cups of fresh nonchlorinated water to the boiling point and add it to the herbs. Cover the mixture and steep for 15–20 minutes, then strain. Drink the infusion warm or cold throughout the day, up to three cups per day. The prepared tea can be kept for about two days in the refrigerator.

Tincture: Combine 4 oz of finely-cut fresh dandelion root and leaf (or 2 oz of dry powdered herb) with 1 pt of brandy, gin, or vodka in a glass container. The alcohol should be enough to cover the plant parts and have a 50/50 ratio of alcohol to water. Cover and store the mixture away from light for about two weeks, shaking several times each day. Strain and store in a tightly capped dark glass bottle. A standard dose is 10–15 drops of the tincture in water, up to three times a day.

Precautions

Dandelion acts as a cholagogue, which means that it increases the flow of bile. It should not be used by persons with closure of the biliary ducts and other biliary ailments.

Side effects

Dandelion is a safe and nutritious herb widely used throughout the world. No health hazards have been reported when dandelion is used in designated therapeutic doses. According to the *PDR For Herbal Medicine*, however, some "superacid gastric complaints"

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could be triggered by using the herb. Dandelion stems contain a liquid latex substance that may be irritating to the skin of senstitive persons.

Interactions

No interactions have been reported between dandelion and standard medications.

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Clare Hanrahan

Dandruff

Definition

Dandruff is the common name for a mild form of seborrheic **dermatitis** of unknown cause. It is a natural and harmless scalp condition in which the shedding of dead skin cells occurs at an unusually fast rate. Because of the oily skin often associated with this condition, these cells clump together and flake off as dandruff.

Description

Dandruff is very common. Up to one-third of the U.S. population is affected by this condition. While it is not considered a disease, dandruff is a cosmetic concern for many people.

The following problems tend to exacerbate dandruff:

- cold weather
- dry indoor heating

Close-up view of the scalp of a 50 year old man with severe dandruff. *(Dr. P. Marazzi / Photo Researchers, Inc.)*

- stress (physical or emotional)
- food allergies
- nutritional deficiencies (B-complex vitamins or omega-3 fatty acids)
- use of hair spray and gels
- use of hair-coloring chemicals
- use of electric hair curlers or blow dryers

Causes and symptoms

Dandruff is caused by an overgrowth of skin cells that make up the scalp. It is not known what accelerates this cell growth. Scientists have suggested that dandruff may be a hypersensitive reaction to the proliferation of *Pityrosporum ovale*, a yeast that occurs naturally on the scalp. Another theory that held for some time linked dandruff to a fungus. A 2002 report said that scientists had identified new fungi of the Malassezia that seem to exist in overabundance on the scalps of those affected with the disease.

Diagnosis

Dandruff is easy to diagnose. The condition is characterized by the appearance of white flakes on the hair or on the shoulders and collar. People with oily hair tend to have dandruff more often. Dandruff usually does not require medical treatment. However, if, in addition to dandruff, a person also has greasy scaling on the face, eyebrows and eyelashes and thick, red patches on the body, he or she may have the more severe form of seborrheic dermatitis. This condition may require medical advice and treatment.

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KEY TERMS

Cytostatic—Suppressing the growth and multiplication of cells.

Flake—A small, thin skin mass.

Scale—Any thin, flaky, plate-like piece of dry skin.

Seborrheic dermatitis—An inflammatory condition of the skin of the scalp, with yellowish greasy scaling of the skin and itching. Other areas of the body may also be affected. Mild seborrheic condition is called dandruff.

Treatment

Alternative treatments for dandruff include nutritional therapy, herbal therapy and **relaxation** therapy.

Nutritional therapy

The following nutritional changes may be helpful:

- Identification and avoidance of potential allergenic foods.
- Limited intake of milk and other dairy products, seafoods and fatty treats. These foods tend to exacerbate dandruff.
- Reduction or elimination of animal proteins and eating mostly whole grains, fresh vegetables, beans and fruit.
- Avoiding citrus until dandruff clears.
- Diet supplemented with B-complex vitamins which may alleviate dandruff condition.
- Avoiding excess salt, sugar, and alcohol.
- Taking 1 tablespoon of flaxseed oil per day. Flaxseed oil is rich in omega-3 fatty acids, which may be effective in treating a variety of skin conditions including dandruff.

From a traditional medical approach, dandruff may be the body's way of eliminating excess protein accumulated but not assimilated in the system. It may also be a symptom of liver and kidney imbalances. A more stabilizing diet is needed, reducing highly acidic foods such as tomatoes and certain spices.

Herbal therapy

Massaging **tea tree oil** (*Melaleuca alternifolia*) into the scalp may help prevent or relieve dandruff. This oil can relieve scaling and **itching**. Ayurvedic treatment also includes various oil therapies, called *suehana* for the head. Increased **exercise** can increase circulation and help eliminate fats and oils.

Relaxation therapies

Relaxation techniques such as **meditation** or **yoga** may help relieve **stress**, which exacerbates dandruff.

Allopathic treatment

There is no cure for this natural harmless skin condition. Because a greasy scalp is associated with dandruff condition, more frequent hair washing using regular shampoo is usually all that is needed. In more severe cases, medicated shampoo may be necessary.

The two most commonly used anti-dandruff shampoos are **selenium** sulfide and **zinc** pyrithione. Both of these are cytostatic agents. Cytostatic drugs slow down the growth and formation of top skin layer on the scalp. To get the best result, one should leave the shampoo on for as long as possible. It is recommended that a person lather the anti-dandruff shampoo at the beginning of the shower, leave it on until the end of the shower, then rinse, lather, and rinse again. As a result of treatment with any of these drugs, dandruff will become less noticeable. Because it can be irritating, shampoo containing selenium sulfide should not be used if the skin is cut or abraded.

Products containing salicylic acid and **sulfur** are reserved for more severe cases. Salicylic acid loosens the dead skin cells so that they can be sloughed off more easily. Sometimes, antibacterial shampoos are used to reduce bacteria on the scalp.

Recently, antifungal products, such as ketoconazole (Nizoral) shampoos, are available over-the-counter (1% preparation) and by prescription (2% preparation). These shampoos are often prescribed by dermatologists to reduce the growth of *P. ovale*. These preparations may be helpful if dandruff is not relieved by other shampoo treatments.

The most severe and recalcitrant dandruff conditions may require tar shampoos. These shampoos reduce the growth of top skin cells on the scalp. It is recommended that the shampoo be left on the hair for at least 10 minutes for best results. Coal tar shampoos can be messy and can stain blond or white hair. Coal tar also can be carcinogenic (causing **cancer**). The FDA approves this product because when used as shampoo, because it contacts the scalp for only a short period of time. Still, it is a good idea to use alternative treatments for this relatively harmless condition.

Because anti-dandruff shampoos may lose effectiveness after a while, it may be helpful to rotate

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between a medicated shampoo and a regular shampoo or try a different type of anti-dandruff shampoo.

Expected results

While one can not cure dandruff, it can be easily managed. A mild dandruff condition often responds to more frequent hair washes with regular shampoo. More severe conditions may require anti-dandruff preparations.

Prevention

Preventive measures include regular hair washing, reducing stress, eating healthy foods and increasing humidity inside the house. In addition, excessive use of hair curlers, hair sprays and gels, and frequent hair coloring should be avoided. These tend to irritate the scalp and may worsen dandruff.

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Mai Tran
Teresa G. Odle

Deadly nightshade *see* **Belladonna**

Deglycyrrhizinated licorice

Description

Deglycyrrhizinated **licorice**, or DGL, is a specific type of preparation derived from the licorice root. It is used differently than herbal licorice because it is much higher in agents that soothe or heal mucous membranes, and lower in other constituents found in licorice root and full extracts of licorice root. DGL may also be spelled, deglycyrrhizinated liquorice. The herb, licorice, from which DGL is derived, is known by the names *Glycyrrhiza*, sweet root, and *Yasti-madhu* with the glycyrrhizin removed.

Licorice is a perennial herb, which is native to the Middle East, and widely cultivated in Europe, the Middle East, and Asia. The root has a long history of use as a medicament and flavoring agent. Its name, *Glycyrrhiza* (sweet root) has been attributed to the first century Greek physician, Dioscorides.

Glycyrrhizin is the cause of pseudoaldosteronism, a condition mimicking the effects of excessive levels of the adrenal hormone aldosterone. The deglycyrrhizinated product was developed to concentrate the demulcent and healing aspects of licorice, while avoiding excess exposure to glycerrhizin and its adverse effects when taken in high doses.

General use

Deglycyrrhizinated licorice is used to soothe and protect the lining of the stomach and duodenum (upper small intestine)—the common sites of gastric ulcers. Ulcers in the stomach are known as peptic ulcers, while those in the small intestine are duodenal ulcers. DGL has been studied for the treatment of peptic and duodenal ulcers, and appears to be both safe and effective for long-term maintenance therapy for certain patients who have these ulcers. Some marketers claim that DGL has anti-inflammatory, antimicrobial, and antioxidant activities. However, these claims are unsubstantiated.

One study, using a mouthwash containing deglycyrrhizinated licorice, showed dramatic improvement in the healing and **pain** of mouth ulcers.

Preparations

DGL is available as:

- capsules, 250 milligrams (mg)
- chewable tablets (with or without sugar), 140 and 380 mg

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KEY TERMS

Aldosterone—A hormone produced by the adrenal gland, instrumental in the regulation of sodium and potassium resorption by the kidney.

Demulcent—An oily or sticky substance used to soothe irritation in mucous membranes.

Expectorant—A medication that promotes the secretion or expulsion of phlegm, mucus, or other matter from the respiratory tract.

Gastritis—Inflammation of the stomach, particularly of its mucous membrane.

Lozenge—A medicated candy intended to be dissolved slowly in the mouth to soothe irritated tissues of the throat.

Milk alkali syndrome—A disorder of the kidneys caused by long-term treatment of ulcers with antacids, particularly alkaline compounds such as sodium bicarbonate, and large amounts of calcium.

- lozenges, 400 mg
- wafers, 380 mg
- liquid, various concentrations

Precautions

Deglycyrrhizinated licorice appears to be very safe. However, severe allergic reactions are possible. There has been one report of a case of milk alkali syndrome in a patient who was drinking unusually large amounts of milk. This has led to a caution against taking **calcium** supplements and deglycyrrhizinated licorice at the same time. It is usually safe at normal dose levels.

Although there have been few studies conducted to determine whether interactions between deglycyrrhizinated licorice and conventional drugs exist, research has failed to identify problems.

Side effects

Gastritis, **nausea**, and **diarrhea** are reported side effects.

Interactions

All clinically significant adverse interactions with licorice have been due to the effects of the glycyrrizic acid. They would not be anticipated with this component removed. DGL reportedly reduces the gastric ulceration caused by aspirin and other non-steroidal anti-inflammatory drugs.

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Samuel Uretsky, Pharm.D.

Dehydroepiandrosterone *see* **DHEA**

Dementia

Definition

Dementia is a loss of mental ability severe enough to interfere with normal activities of daily living, lasting more than six months, not present since birth, and not associated with a loss or alteration of consciousness.

Description

Dementia is a group of symptoms caused by gradual death of brain cells. The loss of cognitive abilities that occurs with dementia leads to impairments in memory, reasoning, planning, and personality. While the overwhelming majority of people with dementia are elderly, the condition is not an inevitable part of **aging**. Instead, dementia is caused by specific brain diseases. **Alzheimer's disease** is the most common cause, followed by vascular or multi-infarct dementia.

The prevalence of dementia has been difficult to determine, partly because of differences in definition among different studies, and partly because there is some normal decline in functional ability with age. Dementia affects 5–8% of all people between ages 65

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and 74, and up to 20% of those between 75 and 84. Estimates for dementia in those 85 and over range from 30–47%. Between two and four million Americans have Alzheimer's disease; that number is expected to grow to as many as 14 million by the middle of the twenty-first century as the population as a whole ages.

The cost of dementia can be considerable. While most people with dementia are retired and do not suffer income losses from their disease, the cost of care is often enormous. Financial burdens include lost wages for family caregivers, medical supplies and drugs, and home modifications to ensure safety. Nursing home care may cost several thousand dollars a month or more. The psychological cost is not as easily quantifiable but can be even more profound. Individuals with dementia lose control of many of the essential features of their life and personality, and loved ones lose a family member even as they continue to cope with the burdens of increasing dependence and unpredictability.

Causes and symptoms

Causes

Dementia is usually caused by degeneration of brain cells in the cerebral cortex, the part of the brain responsible for thoughts, memories, actions, and personality. Death of brain cells in this region leads to the cognitive impairment that characterizes dementia.

The most common cause of dementia is Alzheimer's disease (AD), accounting for half to three-fourths of all cases. The brain of a person with AD becomes clogged with two abnormal structures, called neurofibrillary tangles and senile plaques. Neurofibrillary tangles are twisted masses of protein fibers inside nerve cells, or neurons. Senile plaques are composed of parts of neurons surrounding a group of proteins called beta-amyloid deposits. Why these structures develop is unknown. As of 2008, research indicated possible roles for inflammation, blood flow restriction, and accumulation of aluminum in the brain and toxic molecular fragments known as free radicals or oxidants.

Several genes have been associated with higher incidences of AD, although the exact role of these genes is still unknown. In 2001, investigators discovered a rare mutation in the amyloid precursor protein (APP) that is linked to early-onset Alzheimer's. The discovery pointed scientists toward new ideas for targeting and treating the disease.

Vascular dementia is estimated to cause from 5–30% of all dementias. It occurs from a decrease in blood flow to the brain, most commonly due to a series of small strokes (multi-infarct dementia). Other cerebrovascular causes include: vasculitis from **syphilis**, **Lyme disease**, or **systemic lupus erythematosus**; subdural hematoma; and subarachnoid hemorrhage. Because of the usually sudden nature of its cause, the symptoms of vascular dementia tend to begin more abruptly than those of Alzheimer's dementia. Symptoms may progress stepwise with the occurrence of new strokes. Unlike AD, the incidence of vascular dementia is lower after age 75.

Other conditions that may cause dementia include:

- AIDS
- Parkinson's disease
- Lewy body disease
- Pick's disease
- Huntington's disease
- Creutzfeldt-Jakob disease
- brain tumor
- hydrocephalus
- head trauma
- multiple sclerosis
- prolonged abuse of alcohol or other drugs
- vitamin deficiency: thiamin, niacin, or B_{12}
- hypothyroidism
- hypercalcemia

Symptoms

Dementia is marked by a gradual impoverishment of thought and other mental activities. Losses eventually affect virtually every aspect of mental functioning. The slow progression of dementia is in contrast with delirium, which involves some of the same symptoms, but has a very rapid onset and fluctuating course with alteration in the level of consciousness. However, delirium may occur with dementia, especially since the person with dementia is more susceptible to the delirium-inducing effects of many types of drugs.

Symptoms include:

- Memory losses. Short-term memory loss is usually the first symptom noticed. It may begin with misplacing valuables such as a wallet or car keys, then progress to forgetting appointments, where the car was left, and the route home, for instance. More profound losses may eventually follow, such as forgetting the names and faces of family members.
- Impaired abstraction and planning. The person with dementia may lose the ability to perform familiar tasks, to plan activities, and to draw simple conclusions from facts.

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- Language and comprehension disturbances. Individuals may be unable to understand instructions or follow the logic of moderately complex sentences. Later, they may not understand their own sentences, and they may have difficulty forming thoughts into words.
- Poor judgment. Individuals may not recognize the consequences of their actions or be able to evaluate the appropriateness of behavior. Behavior may become crude or offensive, overly-friendly, or aggressive. Personal hygiene may be ignored.
- Impaired orientation ability. Individuals may not be able to identify the time of day, even from obvious visual clues or may not recognize their location, even if familiar. This disability may stem partly from losses of memory and partly from impaired abstraction.
- Decreased attention and increased restlessness. Individuals may begin an activity and quickly lose interest and wander away frequently. Wandering may cause significant safety problems when combined with disorientation and memory losses. Individuals may begin to cook something on the stove then become distracted and wander away while it is cooking.
- Personality changes and psychosis. Individuals may lose interest in once-pleasurable activities and become more passive, depressed, or anxious. Delusions, suspicion, paranoia, and hallucinations may occur later in the disease. Sleep disturbances may occur, including insomnia and sleep interruptions.
- Apathy. A four-year study by researchers at the University of Nebraska Medical Center reported in 2007 that apathy may be a behavioral marker for dementia. Apathy—a loss of motivation—is identified by symptoms such as diminished initiation, poor persistence, lack of interest, indifference, low social interactions, muted emotional responses, and a lack of insight, according to study researchers. The incidence of apathy may be as high as 80% in people with primary dementia, and the rate increases as the severity of dementia increases, the study reported.

Diagnosis

Since dementia usually progresses slowly, diagnosing it in its early stages can be difficult. Several office visits over several months or more may be needed. Diagnosis begins with a thorough physical exam and complete medical history, usually including comments from family members or caregivers. A family history of either Alzheimer's disease or cerebrovascular disease may provide clues to the cause of symptoms. Simple tests of mental function, including word recall, object naming, and number-symbol matching, are used to track changes in the person's cognitive ability. Some studies suggest that positron emissions tomography (PET) scans of the brain might be able to identify those at risk for Alzheimer's. As these tests become more widely available, they may offer hope for earlier detection of dementia.

Depression is common in the elderly and can be mistaken for dementia; therefore, ruling out depression is an important part of the diagnosis. Distinguishing dementia from the mild normal cognitive decline of advanced age is also critical. The medical history includes a complete listing of drugs being taken, since a number of drugs can cause dementia-like symptoms.

Determining the cause of dementia may require a variety of medical tests, chosen to match the most likely etiology. Cerebrovascular disease, hydrocephalus, and tumors may be diagnosed with x rays, CT or MRI scans, and vascular imaging studies. Blood tests may reveal nutritional or metabolic deficiencies or hormone imbalances.

Treatment

Nutritional supplements

Some nutritional supplements may be helpful, especially if dementia is caused by deficiency of these essential nutrients:

- Acetyl-L-carnitine: improves brain function and increases attention span, enhances ability to concentrate and increases energy in patients with Alzheimer's disease.
- Antioxidants (vitamin E, vitamin C, beta-carotene, or selenium): may slow disease progression by preventing the damaging effects of free radicals. An 18-year long study of more than 4,000 persons reported in 2007 that people who take 50 mg a day of beta-carotene for at least 15 years are less likely to develop dementia than those who do not take the dietary supplement.
- B-complex vitamins and vitamin B_{12}: may significantly improve mental function in patients who have low levels of these essential nutrients.
- Coenzyme Q10: helps deliver more oxygen to the brain.
- DHEA: may increase brain function in old people.
- Magnesium: may be helpful if the dementia is caused by magnesium deficiency and/or accumulation of aluminum in the brain.
- Phosphotidylserine: deficiency of this nutrient may decrease mental function and cause depression.
- Zinc: may boost short-term memory and increase attention span.

Herbal treatment

Herbal remedies that may be helpful in treating dementia include Chinese or **Korean ginseng**, **Siberian ginseng**, **gotu kola**, and *Ginkgo biloba*. Of these, **ginkgo biloba** is the most well-known and widely accepted by

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Western medicine. Ginkgo extract, derived from the leaves of the *Ginkgo biloba* tree, interferes with a circulatory protein called platelet-activating factor. It also increases circulation and oxygenation to the brain. Ginkgo extract has been used for many years in China and is widely prescribed in Europe for treatment of circulatory problems. A 1997 study of patients with dementia appeared to show that gingko extract could reduce their symptoms. Some scientists believe that, taken early enough in the process, *Ginkgo biloba* can delay the onset of Alzheimer's, but this claim has not yet been sufficiently backed by supportive studies. A traditional Chinese herb, *ba wei di huang wan,* is useful in helping slow cognitive and physical decline in people with dementia, according to the American Geriatrics Society.

Homeopathy

A homeopathic physician may prescribe patient-specific homeopathic remedies to alleviate symptoms of dementia.

Acupressure

This form of therapy uses hands to apply pressure on specific **acupressure** points to improve blood circulation and calm the nervous system.

Aromatherapy

Aromatherapists use **essential oils** as inhalants or in baths to improve mental performances and to calm the nerves.

Chelation therapy

This controversial treatment may provide symptomatic improvement in some patients. However, its effectiveness has not been supported by clinical studies. In addition, this form of therapy may cause kidney damage. Therefore, it should only be given under the watchful eyes of a qualified physician.

Other therapy

A Canadian study reported in 2008 that **relaxation** techniques, such as music and **massage therapy**, can decrease agitation and improve the quality of life in persons with dementia. The study showed that playing favorite music to patients and giving them a massage by hand, used individually or together, significantly reduced agitation in people with mild to moderate dementia in a nursing home setting.

Allopathic treatment

As of 2008, there were no therapies that can reverse the progression of Alzheimer's disease. Therefore, treatment of dementia begins with treatment of the underlying disease when possible. Aspirin, estrogen, **vitamin E**, selegiline, propentofylline, and milameline were being evaluated for their ability to slow the rate of progression.

Care for individuals with dementia can be difficult and complex. Patients cope with functional and cognitive limitations, while family members or other caregivers assume increasing responsibility for the person's physical needs.

Symptoms of dementia may be treated with a combination of **psychotherapy**, environmental modifications, and medication. Behavioral approaches may be used to reduce the frequency or severity of problem behaviors, such as aggression or socially inappropriate conduct.

Modifying the environment can increase safety and comfort while decreasing agitation. Home modifications for safety include removal or lock-up of hazards such as sharp knives, dangerous chemicals, and tools. Child-proof latches or Dutch doors may be used to limit access as well. Lowering the hot water temperature to 120°F (48.9°C) or less reduces the risk of scalding. Bed rails and bathroom safety rails can be important safety devices, as well. Confusion may be reduced with simpler decorative schemes and presence of familiar objects. Covering or disguising doors (with a mural, for example) may reduce the tendency to wander. Positioning the bed in view of the bathroom can decrease incontinence.

Two drugs, tacrine (Cognex) and donepezil (Aricept), are commonly prescribed for Alzheimer's disease. These drugs inhibit the breakdown of acetylcholine in the brain, prolonging its ability to conduct chemical messages between brain cells. They provide temporary improvement in cognitive functions for about 40% of patients with mild-to-moderate AD. Hydergine is sometimes prescribed as well, though it is of questionable benefit for most patients. Drugs that are frequently used in dementia patients include antianxiety (for agitation and **anxiety**), antipsychotics (for paranoia, delusions or hallucinations), and antidepressants (for depressive symptoms). Evaluation of any medical side effects from the medications should be ongoing.

Long-term institutional care may be needed for individuals with dementia, as profound cognitive losses often precede death by a number of years. Early planning for the financial costs of nursing home care is critical. Useful information about financial planning for long-term care is available through the Alzheimer's Association.

Expected results

The prognosis for dementia depends on the underlying disease. On average, people with Alzheimer's

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KEY TERMS

Donepezil—A drug commonly prescribed for Alzheimer's disease that provides temporary improvement in cognitive functions for some patients with mild-to-moderate forms of the disease.

Ginkgo extract—Made from the leaves of the *Ginkgo biloba* tree, this extract, used in other countries to treat circulatory problems, may reduce the symptoms of patients with dementia.

Neurofibrillary tangles—Abnormal structures, composed of twisted masses of protein fibers within nerve cells, found in the brains of persons with Alzheimer's disease.

Senile plaques—Abnormal structures, composed of parts of nerve cells surrounding protein deposits, found in the brains of persons with Alzheimer's disease.

Tacrine—A drug commonly prescribed for Alzheimer's disease that provides temporary improvement in cognitive functions for some patients with mild-to-moderate forms of the disease.

disease live eight years past their diagnosis, with a range from one to twenty years. Vascular dementia is usually progressive, with death from **stroke**, infection, or **heart disease**.

Prevention

There is no known way to prevent Alzheimer's disease, although several drugs are under investigation and may reduce its risk or slow its progression. Nutritional supplements, including **antioxidants**, may also help protect against Alzheimer's disease. Some studies also show that use of nonsteroidal anti-inflammatory agents (over-the-counter **pain** relievers such as ibuprofen and naproxen) may lower risk of Alzheimer's. The risk of developing multi-infarct dementia may be reduced by reducing the risk of stroke. Sources of aluminum, which can be found in aluminum cookware, canned sodas, and certain antacids and deodorants, should be avoided.

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ORGANIZATIONS

Alzheimer's Association, 225 N. Michigan Ave., 17th Floor, Chicago, IL, 60601, (800) 272-3900, http://www.alz.org.

American Geriatrics Society, Empire State Building, 350 Fifth Ave., Suite 801, New York, NY, 10118, (212) 308-1414, http://www.americangeriatrics.org.

Division of Aging and Seniors, Health Canada, 200 Eglantine Driveway, Ottawa, ON, K1A 1B4, Canada, (613) 952-7606, http://www.publichealth.gc.ca.

National Institute on Aging, 31 Center Dr., Building 31, Room 5C27, Bethesda, MD, 20892, (800) 222-2225, http://www.nia.nih.gov.

National Institute of Mental Health, 6001 Executive Blvd, Room 8184, MSC 9663, Bethesda, MD, 20892-9663, (866) 615-6464, http://www.nimh.nih.gov.

Mai Tran
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Depression

Definition

Depression, also known as depressive disorders or unipolar depression, is a mental illness characterized by a profound and persistent feeling of sadness or despair and/or a loss of interest in things that once were pleasurable. Disturbance in sleep, appetite, and mental processes are a common accompaniment.

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Symptoms of childhood/adolescent depression

- Drop in school performance
- Appetite changes (usually loss, but sometimes can be an increase)
- Weight loss or gain
- Stomachaches
- Insomnia
- Excessive daytime sleepiness
- Social withdrawal
- Drug or alcohol abuse
- Isolation
- Apathy
- Fatigue
- Lack of concentration

(Illustration by Corey Light. Cengage Learning, Gale)

Symptoms of adult depression

- Long-term sadness
- Feelings of worthlessness or guilt
- Lack of interest in sex
- Loss of concentration, memory, and ability to make decisions
- Loss of interest in activities
- Fatigue
- Weight loss or gain
- Insomnia or oversleeping
- Increased use of alcohol or drug use
- Anxiety
- Suicidal thoughts
- Slowed speech and physical movement

(Illustration by Corey Light. Cengage Learning, Gale)

Description

Everyone experiences feelings of unhappiness and sadness occasionally. However, when these depressed feelings start to dominate everyday life without a recent loss or trauma and cause physical and mental deterioration, they become what is known as depression. Each year in the United States, depression affects an estimated 17 million people at an approximate annual direct and indirect cost of $53 billion. One in four women is likely to experience an episode of severe depression in her lifetime, with a 10–20% lifetime prevalence, compared to 5–10% for men. The average age a first depressive episode occurs is in the mid-20s, although the disorder strikes all age groups indiscriminately, from children to the elderly.

There are two main categories of depression: major depressive disorder and dysthymic disorder. Major depressive disorder is a moderate to severe episode of depression lasting two or more weeks. Individuals experiencing this major depressive episode may have trouble sleeping, lose interest in activities in which they once took pleasure, experience a change in weight, have difficulty concentrating, feel worthless and hopeless, or have a preoccupation with death or suicide. In children, major depression may appear as irritability.

While major depressive episodes may be acute (intense but short-lived), dysthymic disorder is an ongoing, chronic depression that lasts two or more years (one or more years in children) and has an average duration of 16 years. The mild to moderate depression of dysthymic disorder may rise and fall in intensity, and those afflicted with the disorder may experience some periods of normal, nondepressed mood of up to two months in length. Its onset is gradual, and dysthymic patients may not be able to pinpoint exactly when they started feeling depressed. Individuals with dysthymic disorder may experience a change in sleeping and eating patterns, low self-esteem, **fatigue**, trouble concentrating, and feelings of hopelessness.

Depression also can occur in **bipolar disorder**, an affective mental illness that causes radical emotional changes and mood swings, from manic highs to depressive lows. The majority of bipolar individuals experience alternating episodes of mania and depression.

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Causes and symptoms

The causes behind depression are complex and not yet fully understood. While an imbalance of certain neurotransmitters, the chemicals in the brain that transmit messages between nerve cells, is believed to be key to depression, external factors such as upbringing (more so in dysthymia than major depression) may be as important. For example, it is speculated that, if an individual is abused and neglected throughout childhood and adolescence, a pattern of low self-esteem and negative thinking may emerge, and from that, a lifelong pattern of depression may follow. A 2003 study reported that two-thirds of patients with major depression stated they also suffered from chronic **pain**. It is not clear what the relationship is, because while pain inducing conditions are a common cause of depression, one of the first symptoms of depression may be pain.

Heredity seems to play a role in those who develop depression. Individuals with major depression in their immediate family are up to three times more likely to have the disorder themselves. It would seem that biological and genetic factors may make certain individuals predisposed or prone to depressive disorders, but environmental circumstances may often trigger the disorder.

External stressors and significant life changes, such as chronic medical problems, death of a loved one, divorce or estrangement, miscarriage or neonatal death, or loss of a job also can result in a form of depression known as adjustment disorder. Although periods of adjustment disorder usually resolve themselves, occasionally they may evolve into a major depressive disorder.

Major depressive episode

Individuals experiencing a major depressive episode have a depressed mood and/or a diminished interest or pleasure in activities. Children experiencing a major depressive episode may appear or feel irritable, rather than depressed. In addition, five or more of the following symptoms occur on an almost daily basis for a period of at least two weeks:

- significant change in weight
- insomnia or hypersomnia (excessive sleep)
- psychomotor agitation or retardation
- fatigue or loss of energy
- feelings of worthlessness or inappropriate guilt
- diminished ability to think or to concentrate or indecisiveness
- recurrent thoughts of death or suicidal and/or suicide attempts

Dysthymic disorder

Dysthymia commonly occurs in tandem with other psychiatric and physical conditions. Up to 70% of dysthymic patients have both dysthymic disorder and major depressive disorder, known as double depression. **Substance abuse**, panic disorders, personality disorders, social **phobias**, and other psychiatric conditions also are found in many dysthymic patients. Dysthymia is prevalent in patients with certain medical conditions, including **multiple sclerosis**, **AIDS**, **hypothyroidism**, **chronic fatigue syndrome**, **Parkinson's disease**, diabetes, and postcardiac transplantation. The connection between dysthymic disorder and these medical conditions is unclear, but it may be related to the way the medical condition and/or its pharmacological treatment affects neurotransmitters. Dysthymic disorder can lengthen or complicate the recovery of patients who also have medical conditions.

Along with an underlying feeling of depression, people with dysthymic disorder experience two or more of the following symptoms on an almost daily basis for a period of two or more years (most suffer for five years), or one year or more for children:

- under or overeating
- insomnia or hypersomnia
- low energy or fatigue
- low self-esteem
- poor concentration or trouble making decisions
- altered libido
- altered appetite
- altered motivation
- feelings of hopelessness

Diagnosis

The guidelines for diagnosis of major depressive disorder and dysthymic disorder are found in the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.) (*DSM IV*). In addition to an interview, several clinical inventories or scales may be used to assess a patient's mental status and determine the presence of depressive symptoms. Among these tests are: the Hamilton Depression Scale (HAM-D), Child Depression Inventory (CDI), Geriatric Depression Scale (GDS), Beck Depression Inventory (BDI), and the Zung Self-Rating Scale for Depression. These tests may be administered in an outpatient or hospital setting by a general practitioner, social worker, psychiatrist, or psychologist.

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Treatment

A variety of alternative medicines have proven to be helpful in treating depression. A recent report from Great Britain emphasized that more physicians should encourage alternative treatments such as behavioral and self-help programs, supervised **exercise** programs, and watchful waiting before subscribing antidepressant medications for mild depression. Chocolate, coffee, sugar, and alcohol can negatively affect mood; however, this connection may be due to emotional associations of these foods rather than pharmacologic effects. In a 2007 study, researchers found that when women following a weight loss program thought about chocolate, without eating it, they experienced feelings of guilt, which could be tied to minor depression. Similar responses might be associated with other forbidden substances. **Essential fatty acids** may reduce depression and boost mood. Expressing thoughts and feelings in a journal is therapeutic. **Aromatherapy**, particularly citrus fragrance, has had a positive effect on depression. **Psychotherapy** or counseling is an integral component of treatment because it can find and treat the cause of the depression.

Psychosocial therapy

Psychotherapy explores a person's life to bring forth possible contributing causes of depression. During treatment, therapists help individual patients to become aware of their thinking patterns and how these originated. There are several different subtypes of psychotherapy, but all have the common goal of helping patients develop healthy problem solving and coping skills.

Cognitive-behavioral therapy assumes that the patient's faulty thinking causes the current depression and focuses on changing thought patterns and perceptions. Therapists help their patients identify negative or distorted thought patterns and the emotions and behavior that accompany them and then retrain the patients to recognize the thinking and react differently to it.

Chinese medicine and herbals

The principle of treatment of depression involves regulating qi, reducing phlegm, calming the mind, and promoting mental resuscitation. The Chinese medicine *Bai Jin Wan* (White Metal Pill) is used to treat depression (5 g twice daily). A practitioner may prescribe a variety of treatments—including lifestyle changes—depending on the type and severity of the depression.

There is some evidence that **acupuncture** is a helpful treatment for depression. One double-blind study found that patients who received acupuncture specific for depression were significantly less depressed than control patients who had either nonspecific acupuncture or no treatment.

St. John's wort (*Hypericum perforatum*) is the most widely used antidepressant in Germany. Many studies on the effectiveness of St. John's wort have been performed. One review of the studies determined that St. John's wort is superior to placebo and comparable to conventional antidepressants. In early 2000, well designed studies comparing the effectiveness of St. John's wort versus conventional antidepressants in treating depression were conducted in the United States. Despite uncertainty concerning its effectiveness, a 2003 report said acceptance of the treatment continued to increase. A 2006 study compared hypericum with placebo in patients with either minor depression or dysthymia. The treatment showed significant advantages in the non-dysthymia patients only. A poll showed that about 41% of 15,000 science professionals in 62 countries said they would use St. John's wort for mild to moderate depression. Although St. John's wort appears to be a safe alternative to conventional antidepressants, care should be taken, as the herb can interfere with the actions of some pharmaceuticals. The usual dose is 300 mg three times daily.

Orthomolecular therapy

Orthomolecular therapy refers to therapy that strives to achieve the optimal chemical environment for the brain. The theory behind this approach is that mental disease is caused by low concentrations of specific chemicals. Linus Pauling believed that mental disease was caused by low concentrations of the B vitamins, **biotin**, **vitamin C**, or **folic acid**. Supplementation with vitamins B_1, B_2, and B_6 improved the symptoms of depression in geriatric patients taking tricyclic antidepressants. The **amino acids** tryptophan, tyrosine, and phenylalanine have been shown to have positive effects on depression, although large, controlled studies need to be carried out to confirm these findings.

S-ADENOSYL-METHIONINE. In several small studies, S-adenosyl-methionine (SAM, SAMe) was shown to be more effective than placebo and equally effective as tricyclic antidepressants in treating depression. The usual dosage is 200 mg to 400 mg twice daily. In 2003, a U.S. Department of Health and Human Services team reviewed 100 clinical trials on SAMe and concluded that it worked as well as many prescription medications without the side effects of stomach upset and decreased sexual desire.

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5-HYDROXYTRYPTOPHAN. 5-hydroxytryptophan (5-HT, **5-HTP**) is a precursor to serotonin. Most of the commercially available 5-HT is extracted from the plant *Griffonia simplicifolia*. In several small studies, treatment with 5-HT significantly improved depression in more than half of the patients. One review of these studies suggests that 5-HT has antidepressant properties; however, large studies must be performed to confirm this finding. The usual dose is 50 mg three times daily. Side effects include **nausea** and gastrointestinal disturbances.

Homeopathic remedies

Homeopathic remedies can be helpful treatments for depression. A British study claims that more than 75% of treated patients show a favorable response to homeopathic therapy after the second visit. A homeopathic practitioner should be consulted for dosages, but common remedies are:

- *Arum metallicum* for severe depression
- Ignatia for adjustment disorder
- Natrum muriaticum for depression of long duration

Light therapy

Light therapy is helpful in controlling the depression of **seasonal affective disorder** (SAD). Treatment consists of exposure to light of a high intensity and/or specific spectra for an hour per day from a light box placed on the floor or on a table. The light intensity is usually 10,000 lux, which is similar to the light of a sunny day. The opposite may be used as well, which is the use of a dawn simulator for those patients who have an overdose of light exposure and require more sleep with less light. Most persons will see an effect within three to four weeks. Side effects include headaches, eyestrain, irritability, and **insomnia**. A week or more in a sunny climate may improve SAD.

Allopathic treatment

Depression usually is treated with antidepressants and/or psychosocial therapy. When used together correctly, therapy and antidepressants constitute a powerful treatment plan for depressed individuals.

Drugs

Selective serotonin reuptake inhibitors (SSRIs), such as fluoxetine (Prozac) and sertraline (Zoloft), reduce depression by increasing levels of serotonin, a neurotransmitter. Some clinicians prefer SSRIs for treatment of dysthymic disorder. **Anxiety**, **diarrhea**, drowsiness, **headache**, sweating, nausea, poor sexual functioning, and insomnia are all possible side effects of SSRIs. A recent study shows this generation of drugs increases patients' risk of gastrointestinal bleeding.

Tricyclic antidepressants (TCAs) are less expensive than SSRIs but have more severe side effects, including persistent **dry mouth**, sedation, **dizziness**, and cardiac arrhythmias. Because of these side effects, caution is taken when prescribing TCAs to elderly patients. TCAs include amitriptyline (Elavil), imipramine (Tofranil), and nortriptyline (Aventyl, Pamelor). A 10-day supply of TCAs can be lethal if ingested all at once, so these drugs may not be a preferred treatment option for patients at risk for suicide.

Monoamine oxidase inhibitors (MAOIs), such as tranylcypromine (Parnate) and phenelzine (Nardil), block the action of monoamine oxidase (MAO), an enzyme in the central nervous system. Patients taking MAOIs must avoid foods high in tyramine (found in aged cheeses and meats) to avoid potentially serious hypertensive side effects.

Heterocyclics include bupropion (Wellbutrin) and trazodone (Desyrel). Bupropion is prescribed to patients with a seizure disorder. Side effects include agitation, anxiety, confusion, **tremor**, dry mouth, fast or irregular heartbeat, headache, low blood pressure, and insomnia. Because trazodone has a sedative effect, it is useful in treating depressed patients with insomnia. Other possible side effects of trazodone include dry mouth, gastrointestinal distress, dizziness, and headache. In 2003, Wellbutrin's manufacturer released a once-daily version of the drug that offered low risk of sexual side effects or weight gain.

Electroconvulsive therapy

Electroconvulsive therapy (ECT) usually is employed after all therapy and pharmaceutical treatment options have been explored and exhausted. However, it is sometimes used early in treatment when severe depression is present and the patient refuses oral medication or when the patient is becoming dehydrated, extremely suicidal, or psychotic.

The treatment consists of a series of electrical pulses that move into the brain through electrodes on the patient's head. ECT is given under general anesthesia, and patients are administered a muscle relaxant to prevent convulsions. Although the exact mechanisms behind the success of ECT therapy are not known, it is believed that the electrical current modifies the electrochemical processes of the brain, consequently relieving depression. Headaches, muscle soreness, nausea, and confusion are possible side effects immediately following an ECT procedure. **Memory loss**, typically transient, has also been reported in ECT patients. ECT

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KEY TERMS

Dysthemia—A state of chronic, mild depression.

Hypersomnia— Excessive sleeping (can be from 9–20 hours, or more); a symptom of dysthymic and major depressive disorder.

Neurotransmitter—A chemical in the brain that transmits messages between neurons, or nerve cells. Changes in the levels of certain neurotransmitters, such as serotonin, norepinephrine, and dopamine, are thought to be related to depressive disorders.

Psychomotor agitation—Disturbed physical and mental processes (e.g., fidgeting, wringing of hands, racing thoughts); a symptom of major depressive disorder.

Psychomotor retardation—Slowed physical and mental processes (e.g., slowed thinking, movement, and talking); a symptom of major depressive disorder.

Seasonal affective disorder (SAD)—Depression caused by decreased daylight during the winter months.

causes severe memory problems for months or years in one out of every 200 patients treated.

Late in 2001, a study reported on a pacemaker-like device used to treat **epilepsy** adapted for patients with depression. An implanted electronic device sends intermittent signals to the vagus nerve, which in turn carries the signals to the brain, connecting in areas known to regulate mood. Although still experimental at that time, early results in treating depression were encouraging.

Expected results

Untreated or improperly treated depression is the number one cause of suicide in the United States. Proper treatment relieves symptoms in 80–90% of depressed patients. After each major depressive episode, the risk of recurrence climbs significantly—50% after one episode, 70% after two episodes, and 90% after three episodes. For this reason, patients need to be aware of the symptoms of recurring depression and may require long-term maintenance treatment.

Overall, recommendations in the early 2000s from mental health clinicians suggested that the recovery process for patients with depression works best when mental health professionals focus on the whole person behind the disorder. In addition to prescribing medications, they also should address patients' self-esteem, feeling of control, and determination. They emphasize that patients with depression need a sense of optimism and should be encouraged to seek the support of family members and friends.

Prevention

Patient education in the form of therapy or self-help groups is crucial for training patients with depressive disorders to recognize early symptoms of depression and to take an active part in their treatment program. Extended maintenance treatment with antidepressants may be required in some patients to prevent relapse. Early intervention with children with depression is effective in halting development of more severe problems.

ORGANIZATIONS

American Psychiatric Association (APA), Office of Public Affairs, 1400 K St. NW, Washington, DC, 20005, (202) 682-6119, http://www.psych.org/.

American Psychological Association (APA), Office of Public Affairs, 750 First St. NE, Washington, DC, 20002-4242, (202) 336-5700, http://www.apa.org/.

National Alliance for the Mentally Ill (NAMI), 200 North Glebe Road, Suite 1015, Arlington, VA, 22203-3754, (800) 950-6264, http://www.nami.org.

National Depressive and Manic-Depressive Association (NDMDA), 730 N. Franklin St., Suite 501, Chicago, IL, 60610, (800) 826-3632, http://www.ndmda.org.

National Institute of Mental Health (NIMH), 5600 Fishers Lane, Rm. 7C-02, Bethesda, MD, 20857, (301) 443-4513, http://www.nimh.nih.gov/.

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Dermatitis

Definition

Dermatitis is a general term used to describe inflammation of the skin.

Description

Most types of dermatitis are characterized by a pink or red rash that itches.

Contact dermatitis is an allergic reaction to something that irritates the skin and is manifested by one or more lines of red, swollen, blistered skin that may itch or weep. It usually appears within 48 hours after coming into contact with a substance to which the skin is

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sensitive. The condition is more common in adults than in children. The rash most people develop when exposed to poison ivy is an example of contact dermatitis.

Contact dermatitis can occur on any part of the body, but it usually affects the hands, feet, and groin. Contact dermatitis usually does not spread from one person to another, nor does it spread beyond the area exposed to the irritant unless affected skin comes into contact with another part of the body. In the case of some irritants, such as poison ivy, contact dermatitis can be passed to another person or to another part of the body by direct contact. Contact dermatitis can develop when the first contact occurs or after years of use or exposure.

Stasis dermatitis is characterized by scaly, greasy-looking skin on the lower legs and around the ankles. Stasis dermatitis is most apt to affect the inner side of the calf.

Nummular dermatitis, which is also called nummular eczematous dermatitis or nummular **eczema**, generally affects the hands, arms, legs, and buttocks of men and women older than 55 years of age. This stubborn, inflamed rash forms circular, sometimes itchy, patches and is characterized by flares and periods of inactivity.

Itching, scaling, swelling, and sometimes blistering characterize atopic dermatitis. In early childhood it is called infantile eczema and is characterized by redness, oozing, and crusting. It is usually found on the face, inside the elbows, and behind the knees.

Seborrheic dermatitis may be dry or moist. It is characterized by greasy scales and yellowish crusts on the scalp, eyelids, face, external surfaces of the ears, underarms, breasts, and groin. In infants it is called **cradle cap**.

Causes and symptoms

Allergic reactions are genetically determined, and different substances cause contact dermatitis to develop in different people. A reaction to resin produced by poison ivy, poison **oak**, or poison sumac is the most common source of symptoms. It is, in fact, the most common allergy in the United States, affecting one of every two people.

Flowers, herbs, and vegetables (e.g., fresh okra, jalapeno peppers) can affect the skin of some people. **Burns** and **sunburn** increase the risk of dermatitis developing, and chemical irritants that can cause the condition include the following:

- chlorine
- cleansers
- detergents and soaps
- fabric softeners
- glues used on artificial nails
- perfumes
- topical medications

Stasis dermatitis, a consequence of poor circulation, occurs when leg veins can no longer return blood to the heart as efficiently as they once did. When that happens, fluid collects in the lower legs and causes them to swell (**edema**). Stasis dermatitis can also result in a rash that can develop into sores known as stasis ulcers.

The cause of nummular dermatitis is not known, but it usually occurs in cold weather and is most common in people who have dry skin. Hot weather and **stress** can aggravate this condition, as can the following:

- allergies
- fabric softeners
- soaps and detergents
- wool clothing
- bathing more than once a day

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Atopic dermatitis can be caused by **allergies**, **asthma**, or stress. There appears to be a genetic predisposition for atopic conditions. It is sometimes caused by an allergy to nickel in jewelry.

Seborrheic dermatitis, for which there may also be a genetic predisposition, is usually caused by overproduction of the oil glands. In adults it can be associated with **diabetes mellitus** or gold allergy. In infants and adults it may be caused by a **biotin** or vitamin B deficiency.

Diagnosis

The diagnosis of dermatitis is made on the basis of how the rash looks and its location. The doctor may scrape off a small piece of affected skin for microscopic examination. The patient may be directed to discontinue use of any potential irritant that has recently come into contact with the affected area to see if the rash disappears. Two weeks after the rash disappears, the patient may resume use of the suspect substances, one at a time, until the condition recurs. Eliminating the substance most recently added should eliminate the irritation.

If the origin of the irritation has still not been identified, a dermatologist may perform one or more patch tests, which involves dabbing a small amount of a suspected irritant onto skin on the patient's back. If no irritation develops within a few days, another patch

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test is performed. The process continues until the patient experiences an allergic reaction at the spot where the irritant was applied.

Treatment

General herbal therapies for dermatitis can be useful for some conditions. Among the herbs most often recommended are:

- burdock root (*Arctium lappa*)
- calendula (*Calendula officinalis*) ointment
- chamomile (*Matricaria recutita*) ointment
- cleavers (*Galium* ssp.)
- evening primrose oil (*Oenothera biennis*)
- nettles (*Urtica dioica*)

Patients who have a history of dermatitis should remove their rings before washing their hands. They should use bath oils or glycerin-based soaps and bathe in lukewarm saltwater.

Treatments for contact dermatitis

Contact dermatitis can be treated botanically and homeopathically. Specific homeopathic remedies are designed for individuals. Grindelia (*Grindelia* spp.) and **sassafras** (*Sassafras albidum*) can help when applied topically. Oatmeal baths are helpful in relieving the itch. Bentonite clay packs or any mud-pack draws the fluid and helps dry up the lesions. Practitioners of natural medicine do not recommend cortisone creams as they suppress the reaction rather than clear it.

Treatments for atopic dermatitis

NUTRITIONAL THERAPY. Because most cases of atopic dermatitis are caused by food allergy, the following dietary changes are often recommended:

- Identification and avoidance of allergenic foods. Foods that often cause allergy in infants include milk, eggs, peanuts, tomatoes, seafood, wheat, and soybean.
- Supplementing daily diet with vitamin A (5,000 U), vitamin E (400 IU), and zinc (45–60 mg) or alternatively, taking multivitamin-and-mineral supplement one tablet once daily.
- Taking fish oils supplements. Adults should take 540 mg of EPA and 360 mg of docosahexaenoic acid (DHA) per day.

Additionally, flavonoids such as **quercetin**, **grape seed extract**, **green tea** extract, and **ginkgo biloba** may be helpful for some people.

HERBAL THERAPY. The following herbal preparations may be helpful in treating atopic dermatitis:

- *Glycyrrhiza glabra* (licorice)
- *Arctium lappa* (burdock, gobo)
- *Taraxacum officinale* (dandelion)

Treatments for seborrheic dermatitis

Treatments for this common skin disorder include nutritional therapy and topical applications.

NUTRITIONAL THERAPY. Diet is one of the major causes of seborrheic dermatitis especially in infants. Therefore, the following dietary changes and nutritional supplements are often necessary:

- Identification and avoidance of foods that may cause allergies. Common allergenic foods in infants are wheat, corn, citrus, peanuts, eggs, and seafood.
- Eating biotin-rich foods (soy foods, sesame, barley) or taking biotin supplements. Seborrheic dermatitis may be caused by biotin deficiency. Infants often respond well to biotin treatment alone (without vitamin B-complex supplementation).
- Taking daily multivitamin and mineral supplement that provides high amounts of vitamin B-complex, especially vitamin B_6 and zinc. Seborrheic adults often require both vitamin B-complex and biotin supplements.
- Flaxseed oil in the amount of one tablespoon per day for adults. Flaxseed oil is a good source of omega-3 fatty acids that help moisturize the skin and decrease inflammation.

TOPICAL TREATMENT. Selenium-based shampoos are often used to treat greasy scales and crusts on the scalp. Some adults with seborrheic scales on the scalp, nose, brow, and around the mouth respond well to topical treatment with **pyridoxine** (50 mg/g) ointment.

Stasis dermatitis

Stasis dermatitis should be treated by a trained practitioner. This condition responds well to topical herbal therapies; however, the underlying cause of poor circulation must also be addressed.

Allopathic treatment

Treating contact dermatitis begins with eliminating or avoiding the source of irritation. Prescription or over-the-counter corticosteroid creams can lessen inflammation and relieve irritation. Creams, lotions, or ointments not specifically formulated for dermatitis can intensify the irritation. Oral antihistamines are sometimes recommended to alleviate itching, and

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antibiotics are prescribed if the rash becomes infected. Medications taken by mouth to relieve symptoms of dermatitis can make skin red and scaly and cause **hair loss.**

Patting rather than rubbing the skin after bathing and thoroughly massaging lubricating lotion or non-prescription cortisone creams into still-damp skin can soothe red, weepy nummular dermatitis. Highly concentrated cortisone preparations should not be applied to the face, armpits, groin, or rectal area.

Coal-tar salves can help relieve symptoms of nummular dermatitis that have not responded to other treatments, but these ointments have an unpleasant odor and stain clothing.

Patients who have stasis dermatitis should elevate their legs as often as possible and sleep with a pillow between the lower legs. It is important that these patients receive treatment that addresses the cause of their poor circulation.

Tar or **zinc** paste may also be used to treat stasis dermatitis. Because these compounds must remain in contact with the rash for as long as two weeks, the paste and bandages must be applied by a nurse or a doctor.

Coal-tar shampoos may be used for seborrheic dermatitis that occurs on the scalp. Sun exposure after the use of these shampoos should be avoided because the risk of sunburn of the scalp is increased.

Expected results

Dermatitis is often chronic, but symptoms can generally be controlled. Contact dermatitis can be eliminated by avoiding the substance that causes the skin reaction.

Prevention

Contact dermatitis can be prevented by avoiding the source of irritation. If the irritant cannot be avoided completely, the patient should wear gloves and other protective clothing whenever exposure is likely to occur.

Immediately washing the exposed area with soap and water may stem allergic reactions to poison ivy, poison oak, or poison sumac.

Clothing should be loose fitting and 100% cotton. New clothing should be washed in dye-free, unscented detergent before being worn.

Injury to the lower leg can cause stasis dermatitis to ulcerate (form open sores). If stasis ulcers develop, a doctor should be notified immediately.

KEY TERMS

Allergic reaction—An inappropriate or exaggerated genetically determined reaction to a chemical that occurs only on the second or subsequent exposures to the offending agent, after the first contact has sensitized the body.

Corticosteroid—A group of synthetic hormones that are used to prevent or reduce inflammation. Toxic effects may result from rapid withdrawal after prolonged use or from continued use of large doses.

Patch test—A skin test that is done to identify allergens. A suspected substance is applied to the skin. After 24 to 48 hours, if the area is red and swollen, the test is positive for that substance.

Rash—A spotted, pink or red skin eruption that may be accompanied by itching and is caused by disease, contact with an allergen, food ingestion, or drug reaction.

Ulcer—An open sore on the skin, resulting from tissue destruction, that is usually accompanied by redness, pain, or infection.

Yoga and other **relaxation** techniques may help prevent atopic dermatitis caused by stress.

Avoidance of sweating may aid in preventing seborrheic dermatitis.

A patient who has dermatitis should notify a doctor if any of the following occurs:

- fever develops
- skin oozes or other signs of infection appear
- symptoms do not begin to subside after seven days' treatment
- contact with someone who has a wart, cold sore, or other viral skin infection

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Alternative Medicine Foundation., PO Box 60016, Potomac, MD, 20859, (301) 340-1960, http://www.amfoundation.org.

American Dermatological Association., PO Box 551301, Davie, FL, 33355, (954) 452-1113, http://www.amerderm- assn.org.

American Holistic Medical Association., PO Box 2016, Edmonds, WA, 98020, (425) 967-0737, http://www.holisticmedicine.org.

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Detoxification

Definition

Detoxification is one of the more widely used treatments and concepts in alternative medicine. It is based on the principle that illnesses can be caused by the accumulation of toxic substances (toxins) in the body. Eliminating existing toxins and avoiding new toxins are essential parts of the healing process. Detoxification utilizes a variety of tests and techniques.

Origins

Detoxification methods of healing have been used for thousands of years. **Fasting**, a method used often in detoxification treatments, is one of the oldest therapeutic practices in medicine. Hippocrates, the ancient Greek known as the father of Western medicine, recommended fasting as a means for improving health. **Ayurvedic medicine**, a traditional healing system that has developed over thousands of years, uses

Common herbs used for detoxification

Antibiotics	Anticatarrhals (help eliminate mucus)	Blood Cleansers
Clove	Boneset	Burdock root
Echinacea	Echinacea	Dandelion root
Eucalyptus	Garlic	Echinacea
Garlic	Goldenseal root	Oregon grape root
Myrrh	Hyssop	Red clover blossoms
Prickly ash bark	Sage	Yellow dock root
Propolis	Yarrow	
Wormwood		

Diaphoretics/Skin Cleaners	Diuretics	Laxatives
Boneset	Cleavers	Buckthorn
Burdock root	Corn silk	Cascara sagrada
Cayenne pepper	Horsetail	Dandelion root
Elder flowers	Juniper berries	Licorice root
Ginger root	Parsley leaf	Rhubarb root
Goldenseal root	Uva ursi	Senna leaf
Peppermint	Yarrow dock	Yellow dock
Oregon grape root		
Yellow dock		

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detoxification methods to treat many chronic conditions and to prevent illness.

Detoxification treatment has become a cornerstone of alternative medicine. Conventional Western medicine accepts that environmental factors can play a significant role in many illnesses. Environmental medicine is a field that studies exactly how those environmental factors influence disease. Diseases such as **asthma**, **cancer**, **chronic fatigue syndrome** and conditions such as **multiple chemical sensitivity** are strongly influenced by exposure to toxic or allergenic substances in the environment. The United States Centers for Disease Control estimate that over 80% of all illnesses have environmental and/or lifestyle causes.

Detoxification has become a more common treatment as people have been made more aware of environmental pollution. Heavy metals such as lead, mercury, cadmium, and arsenic are by-products of industry. Agriculture chemicals, many of which are known to cause health problems, are also found in food, air, and water. American agriculture uses nearly 10 pounds of pesticides per person on the food supply each year. These toxins have become almost unavoidable. Pesticides that are used only on crops in the southern United States have been found in the tissue of animals in the far north of Canada. DDT, a cancer-causing insecticide that has been banned for decades, is still found in the fatty tissue of animals, birds, and fish, even in extremely remote regions such as the North Pole.

The problem of toxins in the environment is compounded because humans are at the top of the food chain and are more likely to be exposed to an accumulation of toxic substances in the food supply. For instance, pesticides and herbicides are sprayed on grains that are then fed to farm animals. Toxic substances are stored in the fatty tissue of those animals. In addition, those animals are often injected with synthetic hormones, antibiotics, and other chemicals. When people eat meat products, they are exposed to the full range of chemicals and additives used along the entire agricultural chain. Detoxification specialists call this build up of toxins bioaccumulation. They assert that the bioaccumulation of toxic substances over time is responsible for many physical and mental disorders, especially ones that are increasing rapidly such as asthma, cancer, and mental illness. Although there is no scientific proof for many of their assertions, detoxification therapies have increased in popularity.

Benefits

Alternative medical practitioners claim that detoxification is helpful for those individuals suffering from many chronic diseases and conditions, including **allergies**, **anxiety**, arthritis, asthma, chronic **infections**, **depression**, diabetes, headaches, **heart disease**, high **cholesterol**, low blood sugar levels, digestive disorders, mental illness, and **obesity**. It is helpful for people with diseases, such as cancer that are influenced by environmental factors and for those who have been exposed to high levels of toxic materials as a result of accident or occupation. People who have allergies or immune system problems that conventional medicine is unable to diagnose or treat, including chronic **fatigue** syndrome, environmental illness/multiple chemical sensitivity, and **fibromyalgia**, often turn to detoxification therapy for relief. Symptoms for those suffering these conditions may include unexplained fatigue, increased allergies, hypersensitivity to common materials, food intolerances, chronic **indigestion**, aches and pains, low grade **fever**, headaches, **insomnia**, depression, sore throats, sudden weight loss or gain, lowered resistance to infection, general malaise, and disability. Detoxification also can be used as a beneficial preventative measure and as a tool to increase overall health, vitality, and resistance to disease.

Description

Toxins in the body include heavy metals and various chemicals such as pesticides, industrial pollutants, and food additives. Drugs and alcohol also have toxic effects in the body. Toxic wastes are produced as a normal by-product of cellular metabolism and by the bacteria that live in the intestine.

The body has natural methods of detoxification. The liver is the principle organ of detoxification, assisted by the kidneys and intestines. Toxins can be excreted from the body by the kidneys, bowels, skin, and lungs. Detoxification treatments become necessary when the body's natural detoxification systems become overwhelmed. Long-term effects of improper diet, **stress**, overeating, sedentary lifestyles, illness, and poor health habits can cause this in general. When a build up of toxic substances in the body creates illness, it is called toxemia. Some people's digestive tracts become unable to digest food properly, due to years of overeating and **diets** that are high in fat and processed foods and low in fiber (the average American diet). Obstruction of food passing through the large intestine can lead to the growth of harmful microbes.

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This state is known as toxic colon syndrome or intestinal toxemia.

Detoxification therapies try to activate and assist the body's own detoxification processes. They also try to eliminate additional exposure to toxins and strengthen the body and immune system so that toxic imbalances will not occur in the future.

Testing for toxic substances

Detoxification specialists use a variety of tests to determine the causes contributing to toxic conditions. These causes include infections, allergies, addictions, toxic chemicals, and digestive and organ dysfunction. The results of blood, urine, stool, and hair analyses, as well as allergy tests, can indicate problems that may be resolved with detoxification therapy. Detoxification therapists usually have access to laboratories that specialize in sophisticated diagnostic tests for toxic conditions.

People who have toxemia are often susceptible to infection because their immune systems are weakened. Parasites, bacteria, viruses, and fungi can cause infections. Detoxification therapists will screen patients for underlying infections that may be contributing to illness.

Liver function is studied closely using blood and urine tests because the liver is the principle organ in the body responsible for removing toxic compounds. Results of the tests may identify where problems are occurring and may point to specific types of toxins. Blood and urine tests can also screen for toxic chemicals such as PCBs (environmental poisons), formaldehyde (a common preservative), pesticides, and heavy metals. Another useful blood test is a test for **zinc** deficiency, which may indicate **heavy metal poisoning**. Hair analysis is used to test for heavy metal levels in the body. Blood and urine tests that check immune system activity, and hormone levels can also indicate specific toxic compounds. A 24-hour urine analysis, where samples are taken around the clock, allows therapists to determine the efficiency of the digestive tract and kidneys. Together with stool analysis, these tests may indicate toxic digestive system disorders. Certain blood and urine tests may point to nutritional deficiencies so that proper recovery diets can be designed for patients as well.

Detoxification therapists may also perform extensive allergy and hypersensitivity tests. Intradermal (between layers of the skin) and sublingual (under the tongue) allergy tests are used to determine a patient's sensitivity to a variety of common substances, including formaldehyde, auto exhaust, perfume, tobacco, chlorine, jet fuel, and other chemicals.

Food allergies require additional tests because these allergies often cause reactions that are delayed for several days after the food is eaten. The radioallergosorbent test (RAST) is a blood test that determines the level of antibodies (immunoglobulins) in the blood after specific foods are eaten. The cytotoxic test is a blood test that determines if certain substances affect blood cells, including foods and chemicals. The enzyme-linked immunoserological assay activated cell test (ELISA-ACT) is considered one of the most accurate tests for allergies and hypersensitivity to foods, chemicals, and other agents. Other tests for food allergies are the elimination and rotation diets, in which foods are systematically evaluated to determine the ones that are causing problems.

Detoxification therapists usually interview and counsel patients closely to determine and correct lifestyle, occupational, psychological, and emotional factors that may be contributing to illness.

Detoxification therapies

Detoxification therapists use a variety of healing techniques after a diagnosis is made. The first step is to eliminate a patient's exposure to all toxic or allergenic substances. These include heavy metals, chemicals, radiation (from x rays, power lines, cell phones, computer screens, and microwaves), smog, polluted water, foods, drugs, **caffeine**, alcohol, perfume, excess noise, and stress. If **mercury poisoning** has been determined, the patient will be advised to have mercury fillings from the teeth removed, preferably by a holistic dentist.

Specific treatments are used to stimulate and assist the body's detoxification process. Dietary change is immediately enacted, eliminating allergic and unhealthy foods, and emphasizing foods that assist detoxification and support healing. Detoxification diets are generally vegetarian diets low in fat, high in fiber, with a raw food emphasis. Processed foods, alcohol, and caffeine are avoided. Nutritional supplements such as vitamins, minerals, **antioxidants**, **amino acids**, and **essential fatty acids** are often prescribed. **Spirulina** is a sea alga that is frequently given to assist in eliminating heavy metals. Lipotropic agents are certain vitamins and nutrients that promote the flow of bile and fat from the liver.

Many herbal supplements are used in detoxification therapies as well. **Milk thistle** extract, called silymarin, is one of the more potent herbs for detoxifying the liver. Naturopathy, Ayurvedic medicine, and **traditional Chinese medicine** (TCM) recommend numerous herbal formulas for detoxification and

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immune strengthening. If infections or parasites have been found, these are treated with herbal formulas and antibiotics in difficult cases.

For digestive tract disorders, herbal laxatives and high fiber foods such as **psyllium** seeds may be given to cleanse the digestive tract and promote elimination. Colonics are used to cleanse the lower intestines. **Digestive enzymes** are prescribed to improve digestion, and **acidophilus** and other friendly bacteria are reintroduced into the system with nutritional supplements.

Fasting is another major therapy in detoxification. Fasting is one of oldest and quickest ways to promote the elimination of stored toxins in the body and to prompt the healing process. People with severe toxic conditions are supervised closely during fasting because the number of toxins in the body temporarily increases as they are being released.

Chelation therapy is used by detoxification specialists to rid the body of heavy metals. Chelates are particular substances that bind to heavy metals and speed their elimination. Homeopathic medicine also offers remedies for removing heavy metals.

Sweating therapies can detoxify the body because the skin is a major organ of elimination. Sweating helps release those toxins that are stored in the subcutaneous (under the skin) fat cells. Saunas, therapeutic baths, and **exercise** are some of these treatments. Body therapies may also be prescribed, including **massage therapy**, **acupressure**, **shiatsu**, manual lymph drainage, and **polarity therapy**. These body therapies seek to improve circulatory and structural problems, reduce stress, and promote healing responses in the body. Mind/body therapies such as **psychotherapy**, counseling, and stress management techniques may be used to heal the psychological components of illness and to help patients overcome their negative patterns contributing to illness.

Practitioners and treatment costs

The costs of detoxification therapies can vary widely, but can be quite expensive depending on the number of tests and treatments required. Some of these tests may not be covered by medical insurance. Detoxification treatments can be lengthy and involved since illnesses associated with toxic conditions usually develop over many years and may not resolve quickly. Detoxification treatments may be lengthy because they often strive for the holistic healing of the body, mind, and emotions.

Practitioners may be conventionally trained medical doctors with specialties in environmental medicine or interests in alternative treatment. The majority of detoxification therapists are alternative practitioners, such as naturopaths, homeopaths, Ayurvedic doctors, or traditional Chinese doctors. Insurance coverage varies, depending on the practitioner and the treatment involved. Consumers should review their individual insurance policies regarding treatment coverage.

KEY TERMS

Allergen—A foreign substance, such as mites in house dust or animal dander that, when inhaled, causes the airways to narrow and produces symptoms of asthma.

Antibody—A protein, also called immunoglobulin, produced by immune system cells to remove antigens (the foreign substances that trigger the immune response).

Ayurvedic medicine—A 5,000–year old system of holistic medicine developed on the Indian subcontinent. Ayurvedic medicine is based on the idea that illness results from a personal imbalance or lack of physical, spiritual, social, or mental harmony.

Fibromyalgia—A condition of debilitating pain, among other symptoms, in the muscles and the myofascia (the thin connective tissue that surrounds muscles, bones, and organs).

Hypersensitivity—The state where even a tiny amount of allergen can cause severe allergic reactions.

Multiple chemical sensitivity—A condition characterized by severe and crippling allergic reactions to commonly used substances, particularly chemicals. Also called environmental illness.

Toxemia—The presence of toxic substances in the bloodstream.

Preparations

Patients can assist diagnosis and treatment by keeping detailed diaries of their activities, symptoms, and contact with environmental factors that may be affecting their health. Reducing exposure to environmental toxins and making immediate dietary and lifestyle changes may speed the detoxification process.

Side effects

During the detoxification process, patients may experience side effects of fatigue, malaise, aches and pains, emotional duress, **acne**, headaches, allergies, and symptoms of colds and **influenza**. Detoxification specialists claim that these negative side effects are

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part of the healing process. These reactions are sometimes called "healing crises". They are caused by temporarily increased levels of toxins in the body due to elimination and cleansing.

Research and general acceptance

Although environmental medicine is gaining more respect within conventional medicine, detoxification treatment is scarcely mentioned by the medical establishment. The research that exists on detoxification is largely testimonial, consisting of individual personal accounts of healing without statistics or controlled scientific experiments. In the alternative medical community, detoxification is an essential and widely accepted treatment for many illnesses and chronic conditions.

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American Holistic Medical Association, P. O. Box 2016, Edmonds, WA, 98020, (425) 967-0737. http://www.holisticmedicine.org.

Cancer Prevention Coalition, c/o University of Illinois at Chicago School of Public Health, MC 922, 2121 West Taylor Street, Chicago, IL, 60612, (312) 996-2297. http:\\www.preventcancer.com.

Center for Occupational and Environmental Medicine, 7510 Northforest Dr., North Charleston, SC, 29420, (843) 572-1600. http://www.coem.com.

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Devil's claw

Description

Devil's claw (*Harpagophytum procumbens*) is an African plant whose fruit looks like a giant claw. The plant grows in an arid climate and is found in Namibia, Madagascar, the Kalahari Desert, and other areas on the African continent. The tuberous roots are used in traditional medicine. The root is collected when the rainy season ends. The root is chopped and dried in the sun for three days. Devil's claw is also known as grapple plant and wood spider.

General use

Devil's claw has been used for numerous conditions in several areas of the world. In South Africa, the root and tuber have been used for centuries as an all-purpose folk remedy. Devil's claw has been used to reduce **fever** and **pain**, to treat **allergies** and **headache**, and to stimulate digestion. Traditional healers also used devil's claw to treat inflammatory conditions such as arthritis, rheumatism, and lower back pain. Devil's claw has also been used as a remedy for liver and kidney disorders.

Devil's claw root was also used in folk medicine as a pain reliever and for complications with pregnancies. In addition, an ointment made from devil's claw was used for skin injuries and disorders.

European colonists brought the African plant back to their continent where it was used to treat arthritis. In the United States, use of devil's claw dates back to the time of slavery. The slaves brought herbs and herbal knowledge with them to the new continent.

Devil's claw has been used as an herbal remedy in Europe for a long time. Current uses for devil's claw are much the same as they were centuries ago. In Europe, the herb is still a remedy for arthritis and other types of joint pain, such as **rheumatoid arthritis**, **osteoarthritis**, and **gout** (a painful joint inflammation disease).

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Devil's claw (*Harpagophytum procumbens*). *(PHOTOTAKE Inc. / Alamy)*

Devil's claw is also used for soft tissue conditions with inflammation, like **tendinitis** and **bursitis**. The bitter herb is also used as a remedy for loss of appetite and mildly upset stomach.

The herb is currently used for other conditions such as problems with **pregnancy**, **menstruation**, and **menopause**. Devil's claw is also regarded as a remedy for headaches, **heartburn**, liver and gallbladder problems, allergies, skin disorders, and nicotine poisoning.

European research during the late 1990s indicated that devil's claw relieved arthritis and joint pain conditions. The herb also helped with soft muscle pain such as tendinitis. However, there is no evidence that proves devil's claw is an effective remedy for other conditions such as difficulties during pregnancy and skin disorders.

Preparations

Several forms of devil's claw are used. In Europe, doctors treat some conditions like arthritis with an injection of devil's claw extract. The herb is taken internally as a tea or in capsule form. When taken for pain relief, devil's claw must be taken regularly for up to one month before results are seen. An ointment form of devil's claw can be applied to the skin to treat **wounds** or scars.

Herbal tea and tincture

Devil's claw tea is prepared by pouring 1.25 cups (300 ml) boiling water over 1 tsp (4.5 g) of the herb. The mixture, which is also called an infusion, is steeped for eight hours and then strained. The daily dosage is 3 cups of warm tea.

For most conditions, the average daily dosage is 1 tsp (4.5 g) of devil's claw herb. However, the amount is reduced to 1/3 tsp (1.5 g) when devil's claw is taken for appetite loss.

In a tincture, the herb is preserved with alcohol. The tincture steeps for two weeks and is shaken daily. It is then strained and bottled. When devil's claw tincture is used as a remedy, the dosage is 1 tsp (4.5 g) taken three times per day for a specified period.

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Tea and tincture should be consumed 30 minutes before eating. This allows for better absorption of the herb.

Devil's claw capsules

The anti-inflammatory properties of devil's claw are attributed to two constituents, harpagoside and beta sitoserol. If a person takes devil's claw capsules or tablets as a remedy, attention should be paid to the harpagoside content. The daily amount of harpagoside in capsules should total 50 mg.

Combinations

For arthritis treatment, devil's claw can be combined with anti-inflammatory or cleansing herbs. In addition, devil's claw can be combined with bogbean or meadowsweet. An herbalist, naturopathic doctor, or traditional healer can provide more information on herb combinations appropriate for a specific condition.

Precautions

Devil's claw is safe to use when proper dosage recommendations are followed, according to sources including the *PDR (Physician's Desk Reference) for Herbal Medicines*, the 1998 book based on the 1997 findings of Germany's Commission E.

Although devil's claw has not undergone the U.S. Food and Drug Administration (FDA) research required for approval as a remedy, other studies in Europe confirm that devil's claw is safe for most people. People with ulcers should be cautious because the herb stimulates the production of stomach acid.

Furthermore, it is not known if devil's claw is safe for people with major liver or kidney conditions. In addition, devil's claw could cause an allergic reaction.

There is some debate in the alternative medicine community about whether pregnant women can use devil's claw as a remedy. Some researchers say that the herb is safe to use; others say that not enough research has been done to prove that the herb is safe for pregnant women. There appears to be no scientific proof that using devil's claw could result in miscarriages.

Side effects

Devil's claw could cause an allergic reaction or mild gastrointestinal difficulties.

Interactions

No interactions between other medications and devil's claw have been reported according to the *PDR for Herbal Medicines*. However, the herb may possibly block the effect of medication taken to correct abnormal heart rhythms.

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ORGANIZATIONS

American Botanical Council. PO Box 201660, Austin TX, 78720. (512) 331-8868. http://www.herbalgram.org/.

Arthritis Foundation. 1330 W. Peachtree St., Atlanta, GA 30309. http://www.arthritis.org.

Herb Research Foundation. 1007 Pearl St., Suite 200, Boulder, CO 80302. (303) 449-2265. http://www.herbs.org.

Liz Swain

DGL *see* **Licorice; Deglycyrrhizanated licorice**

DHEA

Description

DHEA is the acronym for dehydroepiandrosterone, a hormone produced naturally from **cholesterol** in the adrenal glands of males and females. It is a precursor to the male sex hormone testosterone. It is also sold as an over-the-counter dietary supplement.

The human body produces very little DHEA until about the age of seven, when production soars. Production peaks in the mid-20s and starts to decline in the early 30s. By the mid-70s, DHEA production has dropped by about 80 to 90% of its maximum. At all ages, DHEA levels are slightly higher in men than women. The optimum DHEA level in a healthy adult is 750 to 1,250 milligrams per deciliter of blood (mg/dL) for men and 550 to 980 mg/dL for women.

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DHEA was first identified in 1934 and was sold over the counter mainly as a weight loss aid until the late 1980s. Then the U.S. Food and Drug Administration (FDA) classified DHEA as a drug, making it available by prescription only. The FDA reversed itself in 1994, reclassifying DHEA as a dietary supplement obtainable without a prescription.

A 1994 study by researchers at the University of California, San Diego, looked at 30 middle-age men and women who took 50 mg of DHEA a day for three months. The test subjects generally reported an improved sense of well-being, increased energy, enhanced sex drive, and an improved ability to deal with **stress**. The results were widely reported by the mass media, with several referring to DHEA as the "fountain of youth hormone."

Despite hundreds of studies of DHEA between the late 1970s and the late 2000s, researchers remain unclear as to how the hormone works or exactly what it does in the body. Although it is known that DHEA decreases with age, it is not known whether this constitutes a deficiency or is because the body needs less DHEA as it ages.

So little is known about DHEA because the hormone is not patentable, so drug companies are unwilling to spend money doing further research on it. Much of the research as of 2008 is funded through universities and the National Institute on **Aging** (NIA) that maintains a skeptical attitude about DHEA supplementation. In one statement on the use of DHEA (January 19, 2007), NIA noted that it "does not recommend taking any supplement, including DHEA and **melatonin**, that is touted as an 'anti-aging' remedy because no supplement has been proven to serve this purpose."

General use

Originally marketed as a weight loss supplement, DHEA was later promoted as beneficial for treating a wide variety of medical conditions, including **cancer**, **heart disease**, Alzheimer's, and **AIDS**. It was also purported to have anti-aging qualities. Studies in rodents and test tubes showed that daily doses of DHEA seemed to prevent or to improve such conditions as cancer, heart disease, **osteoporosis**, diabetes, lupus, **obesity**, and viral **infections**. Far fewer long-term studies had been done on humans, and the results were often conflicting. In general, DHEA supplementation seemed to be more beneficial to men than women. In 2008, the Mayo Clinic Web site listed 28 uses for which DHEA has been recommended. It said that there was "good scientific evidence" for four of those uses (in the treatment of adrenal insufficiency, **depression**, obesity, and **systemic lupus erythematosus**), "fair scientific evidence against the use" of four other treatments (**fibromyalgia**, as an immune system stimulant, as a memory enhancer, and for muscle strength) and "unclear scientific evidence" on the other 20 uses.

Preparations

Most DHEA is derived from Mexican wild yams through a chemical process. Eating the yams will not produce the hormone. DHEA is generally taken once daily. Dosage recommendations vary. Allopathic physicians who support DHEA supplementation usually recommend 5 to 10 mg once a day. Some homeopathic health practitioners recommend 10 to 50 mg a day. Ray Sahelian, a physician and author of several books on dietary supplements, recommends "hormone holidays." With this approach, persons would take DHEA every other day, five days in a row and two days off, or go off it one or two weeks a month. DHEA commonly is sold in tablets of 5 mg, 10 mg, 25 mg, and 50 mg. It also is available as a cream, ointment, lozenge, and herbal tea.

Precautions

Several studies have shown DHEA may increase the risks of **prostate cancer** in men and endometrial cancer in women. Medical experts suggest that individuals have a blood test to determine existing DHEA and other hormone (testosterone or estrogen) levels before taking DHEA supplements. Also, men taking the supplement should have regular PSA tests and women should have periodic mammograms since DHEA may promote the growth of **breast cancer**.

There are several warnings associated with DHEA use. It should not be taken by men who have a history of prostate problems or by women with a history of breast, ovarian, or **uterine cancer**. It is not recommended for anyone under age 40 or by women who are pregnant, nursing, or who are of childbearing age. Women who are taking an estrogen replacement, who have a history of heart disease, and anyone with other significant health problems should consult their doctor before taking DHEA.

Side effects

Some side effects have been reported and are usually associated with doses of 5 mg a day or more. These include **acne**, body and facial hair growth in women, enlarged breasts in men, scalp **hair loss**, **anxiety**, **insomnia**, headaches, mood changes, and **fatigue**. DHEA can cause menstrual irregularities in women under age 50 and may decrease HDL (good cholesterol) in women. A

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KEY TERMS

Adrenal glands—A pair of endocrine organs near the kidneys that produce steroids such as sex hormones, hormones associated with metabolic functions, and epinephrine.

Cholesterol—A fatty substance manufactured in the liver and carried throughout the body in the bloodstream.

Endometrial—Pertaining to the endometrium, a mucous membrane lining the uterus.

Estrogen—A hormone that stimulates development of female secondary sex characteristics.

Lupus—A group of diseases characterized by skin lesions.

Osteoporosis—A condition or disease characterized by low density and fragility of the bones.

Pregnenolone—A steroid ketone formed by the oxidation of other steroids, such as cholesterol, a precursor to the hormone progesterone.

PSA test—A blood test to determine prostate-specific antigen levels in men, which can help determine the risk for prostate cancer.

Testosterone—A male hormone produced in the testes or made synthetically that is responsible for male secondary sex characteristics.

few cases of irregular heart rhythm have been reported in people taking 25 to 50 mg a day of DHEA.

Interactions

DHEA functions similarly to pregnenolone, so the two should not be taken together in full doses. Natural Standard, an international organization that studies the risks and benefits of complementary and alternative therapies, suggests a number of possible interactions between DHEA and certain drugs, including triazolam (Halcion); carbamazepine; phenytoin; anticoagulants and antiplatelet drugs, such as warfarin (Coumadin), heparin, and clopidogrel (Plavix); diltiazem (Cardizem) and alprazolam (Xanax); clofibrate and tamoxifen; insulin; corticosteroids, such as dexamethasone; danazol; opiate painkillers; and estrogen-containing drugs. Interactions may also occur with certain herbal products, such as chasteberry (*Vitex agnus-castus*), **bitter melon** (*Momordica charantia*), **Ginkgo biloba**, **garlic** (*Allium sativum*), coenzyme Q10, Panax ginseng, **red clover** (*Trifolium pratense*), **hawthorn** (*Crataegus oxycantha*), **chromium** picolinate, and **carnitine**.

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Diabetes mellitus

Definition

Diabetes mellitus is a disease in which the body is unable to properly use (metabolize) sugar (glucose). It arises from two causes. In type 1 diabetes (formerly called insulin-dependent, juvenile, or childhood-onset diabetes), the pancreas, a digestive organ, does not produce enough of the hormone insulin to allow the body to use glucose. Type 2 diabetes (formerly called noninsulin dependent or adult-onset diabetes) occurs when the pancreas produces insulin, but cells in the body stop responding to the hormone. In either case, the result is that glucose builds up in the blood because

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Symptoms of diabetes mellitus

- Excessive thirst
- Increased appetite
- Increased urination
- Unexplained weight loss
- Fatigue
- Nausea
- Blurred vision
- Frequent vaginal infections in women
- Impotence in men
- Frequent yeast infections

(Illustration by Corey Light. Cengage Learning, Gale)

the body cannot use it. Gestational diabetes is transient diabetes that occurs during **pregnancy** and resolves after pregnancy.

Description

Diabetes mellitus is a chronic disease that contributes to serious health complications, including renal (kidney) failure, **heart disease**, **stroke**, and blindness. In 2007, diabetes affected an estimated 246 million people worldwide, with that number estimated to grow by 7 million per year. The highest rate of growth is expected to occur in developing countries. Of people with diabetes, 9 out of 10 have type 2 diabetes. The five countries with the largest numbers of people with diabetes are India, China, the United States, Russia, and Germany. Worldwide 3.8 million deaths are directly attributable to diabetes. The disease also is a contributing factor in many deaths due to cardiovascular disease.

In the United States in 2005, approximately 20.8 million people, or 7% of the population, had diabetes. Of these, 14.6 million were diagnosed with the disease, while another estimated 6.2 million remained undiagnosed. Another 54 million people have pre-diabetes. In pre-diabetes, blood glucose levels are higher than normal, but not so high as to justify a diagnosis of diabetes. The number of people with diabetes in the United States is increasing rapidly, especially among overweight and obese children.

Background

Every cell in the body needs energy to function. The body's primary energy source is glucose, a simple sugar that results from the digestion of foods containing carbohydrates (sugars and starches). Glucose from digested food circulates in the blood (blood glucose) as a ready energy source for cells. Insulin is a hormone produced by cells in the pancreas and released into the bloodstream. Insulin binds to receptor sites on the outside of cells and acts like a key to open a doorway into the cell through which glucose can enter. When not enough insulin is produced or when the doorway no longer recognizes the insulin key (a condition called **insulin resistance**), glucose stays in the blood instead of entering the cells. This results in high blood glucose levels, a condition called hyperglycemia.

For the body to function properly, the level of glucose in the blood must remain stable within fairly narrow limits. When the blood glucose level gets too high, the body attempts to dilute the concentration of glucose in the blood by drawing water out of the cells and into the bloodstream. The excess glucose, along with water, is then excreted in urine. It is common for people with undiagnosed or uncontrolled diabetes to be constantly thirsty, to drink large quantities of water, and produce large quantities of dilute, sweet-smelling urine as their bodies try to remove excess glucose from the blood.

At the same time that the body is trying to remove glucose from the blood, the cells are starving for glucose and sending signals to the body to eat more food, thus causing people with diabetes to be constantly hungry. To provide energy for the starving cells, the body also converts fats and proteins into glucose, an activity that does not require insulin. The breakdown of fats and proteins for energy causes acid compounds called ketones to form in the blood. These ketones cause the breath of an uncontrolled diabetic to smell like acetone (nail polish remover). Ketones are also excreted in urine. As ketones build up in the blood, the blood becomes more acidic and a condition called ketoacidosis can occur. If left untreated, ketoacidosis can lead to coma and death.

Types of diabetes mellitus

Type 1 diabetes begins most often during childhood or adolescence. In this type of diabetes, the pancreas produces little or no insulin. Type 1 diabetes is characterized by a sudden onset. It occurs more frequently in people of northern European ancestry than in those from southern European countries, the Middle East, or Asia. This form of diabetes also is

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called insulin-dependent diabetes because people who develop type 1 diabetes need injections of insulin one or more times daily.

Brittle diabetics, sometimes called uncontrolled diabetics, are a subgroup of individuals with type 1 diabetes. These individuals, even when carefully complying with their insulin and diet regimen, have frequent and rapid swings of blood sugar levels moving between hyperglycemia (a condition in which there is too much glucose or sugar in the blood) and **hypoglycemia** (a condition in which there are abnormally low levels of glucose or sugar in the blood). These diabetics may require several injections of different types of insulin or an insulin pump during the day to keep their blood sugar within a fairly normal range.

The more common form of diabetes, type 2 diabetes, occurs in approximately 3 to 5% of Americans under age 50, and increases to 10 to 15% in those older than 50. More than 90% of the diabetics in the United States are type 2 diabetics. Symptoms of type 2 diabetes are milder than those of type 1 diabetes. As a result, many people (as many as 80% in some developing countries) with type 2 diabetes remain undiagnosed. This form of diabetes occurs most often in people who are overweight and who do not get adequate **exercise**. It also is more common in people of Native American, Hispanic, and African American descent. Type 2 diabetes appears to be somewhat linked to diet. People who have migrated to Western cultures from East India, Japan, and Australian Aboriginal cultures are more likely to develop type 2 diabetes than those who remain in their original countries.

Type 2 diabetes is initially a milder form of diabetes because of its slow onset (sometimes developing over the course of several years) and because it can often be controlled with diet, exercise, and oral medication instead of insulin injections. The consequences of uncontrolled and untreated type 2 diabetes, however, are just as serious as those for type 1. This form of diabetes also is called noninsulin-dependent diabetes, a term that is somewhat misleading. Many people with type 2 diabetes can control the condition with diet and oral medications; however, when this fails, insulin injections are necessary.

Another form of diabetes, called gestational diabetes, can develop during pregnancy. It usually resolves after the baby is delivered. This diabetic condition develops during the second or third trimester of pregnancy in about 2% of pregnancies. The condition usually is treated by diet; however, insulin injections may be required. Women who have diabetes during pregnancy are at higher risk for developing type 2 diabetes within 5 to 10 years.

Diabetes also can develop as a result of pancreatic disease, **alcoholism**, malnutrition, or other severe illnesses that **stress** the body and damage the pancreas.

Causes and symptoms

The causes of diabetes mellitus are unclear; however, there seem to be both complex hereditary (genetic factors passed on in families) and environmental factors involved. Research has shown that some people who develop diabetes have common genetic markers, but identical twins do not always both develop diabetes. In type 1 diabetes, an autoimmune response is believed to be triggered by a virus, other microorganism, or exposure to an environmental toxin. This causes the immune system to incorrectly identify its own insulin-producing cells as foreign material and to destroy them.

Ketoacidosis, a condition caused by starvation or uncontrolled diabetes, is common in type 1 diabetes. Ketones are acid compounds that form in the blood when the body breaks down fats and proteins. Symptoms include abdominal **pain**, **vomiting**, rapid breathing, extreme tiredness, and drowsiness. Patients with ketoacidosis will also have a sweet breath odor. Left untreated, this condition can lead to diabetic coma and death.

In type 2 diabetes, the pancreas may produce enough insulin; but cells have become resistant to the insulin produced, so that it does not work effectively. Symptoms of type 2 diabetes can begin so gradually that individuals may not know that they have it. Age, **obesity**, diet, and family history of diabetes all play significant roles in the development of type 2 diabetes.

Early signs of type 2 diabetes include tiredness, extreme thirst, and frequent urination. Other symptoms may include sudden weight loss, slow wound healing, urinary tract **infections**, **gum disease**, or blurred vision. It is common for type 2 diabetes to be detected while a patient is seeing a doctor about a health concern caused by the yet undiagnosed diabetes. Symptoms of type 1 diabetes are similar to those of type 2 diabetes, but often develop suddenly (over days or weeks) in previously healthy children or adolescents.

Individuals who are at high risk of developing type 2 diabetes mellitus include people who have the following characteristics:

- are obese (a body mass index [BMI] of 30 or higher)
- have a close relative with diabetes mellitus

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- belong to a high-risk ethnic population (African American, Native American, Hispanic, or Native Hawaiian)
- have been diagnosed with gestational diabetes or have delivered a baby weighing more than 9 lbs (4 kg)
- have high blood pressure (140/90 mmHg or above)
- have a high density lipoprotein (HDL or "bad") cholesterol level less than or equal to 35 mg/dL and/or a triglyceride level greater than or equal to 250 mg/dL
- have had impaired glucose tolerance or impaired fasting glucose on previous tests

Several common drugs can impair the body's use of insulin, causing a condition known as secondary diabetes. These medications include treatments for high blood pressure (furosemide, clonidine, and thiazide diuretics), drugs with hormonal activity (oral contraceptives, thyroid hormone, progestins, and glucocorticorids), and the anti-inflammation drug indomethacin. Several drugs used to treat mood disorders also can impair glucose absorption. These drugs include haloperidol, lithium carbonate, phenothiazines, tricyclic antidepressants, and adrenergic agonists. Other drugs that can cause diabetes symptoms include isoniazid, nicotinic acid, cimetidine, and heparin.

Diagnosis

Diabetes is suspected based on symptoms. Urine tests and blood tests are used to confirm a diagnosis of diabetes. These tests measure the amount of glucose in the urine and blood. Urine tests also can detect ketones and protein in the urine, which may help to diagnose diabetes and assess how well the kidneys are functioning. These tests are also used to monitor the disease once the patient is under treatment.

Urine tests

Clinistix and Diastix are paper strips or dipsticks that change color when dipped in urine. The test strip is compared to a chart that shows the amount of glucose in the urine based on the change in color. The level of glucose in the urine lags behind the level of glucose in the blood. Testing the urine with a test stick, paper strip, or tablet is not as accurate as blood testing, but it can give a fast, simple, noninvasive reading.

Ketones in the urine can be detected using similar types of dipstick tests (Acetest or Ketostix). Ketoacidosis can be life-threatening in type 1 diabetics, so having a quick and simple test to detect ketones can assist in establishing a diagnosis rapidly.

Another dipstick test can determine the presence of protein or albumin in the urine. Protein in the urine can indicate problems with kidney function and can be used to track the development of renal failure. A more sensitive test for urine protein uses radioactively tagged chemicals to detect microalbuminuria, small amounts of protein in the urine, which may not show up on dipstick tests.

Blood tests

In a **fasting** plasma glucose test (FPT), blood is drawn from a vein in the patient's arm after the patient has not eaten for at least eight hours, usually in the morning before breakfast. The red blood cells are separated from the sample and the amount of glucose is measured in the remaining plasma. A plasma level of 99 mg/dL or below is normal. Readings of 100–125 mg/dL indicate pre-diabetes (impaired fasting glucose) and readings of 126 mg/dL or greater indicate diabetes. The fasting glucose test is usually repeated on another day to confirm the results. A postprandial glucose test in which blood is taken shortly after the patient has eaten a meal may also be done.

In the oral glucose tolerance test, blood samples are taken from a vein before and after a patient drinks a sweet syrup of glucose and other sugars. In a nondiabetic, the level of glucose in the blood goes up immediately after the drink and then decreases gradually as insulin is used by the body to metabolize, or absorb, the sugar. In a person with diabetes, the glucose in the blood goes up and stays high after drinking the sweetened liquid. A plasma glucose level after two hours that is 139 mg/dL is normal. Two-hour readings of 140 to 199 mg/dL indicate pre-diabetes and readings of 200 mg/dL or higher at two hours after drinking the syrup and at one other point during the two-hour test period confirms the diagnosis of diabetes.

In 2002, scientists announced that a simple blood test to screen for diabetes had been developed. Before that time, community-wide screening procedures had not proven cost-effective. The screening test was shown to be cost-effective if conducted in physician offices on patients with the three known risk factors of obesity, self-reported high blood pressure, and family history of diabetes.

Home blood glucose monitoring kits are available so diabetics can monitor their own levels. A small needle or lancet is used to prick the finger and a drop of blood is collected and analyzed by a monitoring device. Some patients may test their blood glucose levels several times during a day and use this information to adjust their diet or insulin dosage.

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In the United States beginning in the early 2000s, a small number of service dogs, mostly Labrador retrievers, were trained to detect ketones in their diabetic human companions by smell. The dogs are trained to give a behavioral signal to the handler if they detect a smell that indicates the handler's metabolism is out of balance. Their acute sense of smell allows them to warn the diabetic handler of problems before the person can physically sense them. These dogs are permitted to travel in public places with their handlers under the Americans with Disabilities Act.

Treatment

There is no cure for diabetes. Treatment of diabetes focuses on two goals: keeping blood glucose within the normal range and preventing the development of long-term complications. Diet, exercise, medication, and careful monitoring of blood glucose levels are the keys to managing diabetes so that patients can live healthier lives. Diabetes can be life-threatening if not properly managed, so individuals should not attempt to treat this condition without medical supervision. Alternative treatments cannot replace the need for insulin, but they may enhance insulin's effectiveness and may lower blood glucose levels. In addition, alternative medicines may help to treat complications of the disease and improve quality of life.

Diet

Both conventional and alternative medicine practitioners agree that diet and moderate exercise are the first treatments to be implemented in diabetes. For overweight and obese type 2 diabetics, weight loss is an important goal to help them to control their blood glucose levels. A well-balanced, nutritious diet provides approximately 50 to 60% of calories from carbohydrates, approximately 10 to 20% of calories from protein, and less than 30% of calories from fat. The number of calories required depends on the patient's age, weight, and activity level. Calorie intake also needs to be distributed fairly evenly over waking hours so that surges of glucose entering the blood are kept to a minimum. Generally, whole grains and foods that provide large amounts of dietary fiber are helpful in controlling blood glucose levels and reducing glucose surges in people with type 2 diabetes.

Keeping track of the number of calories provided by different foods can be complicated, so patients are usually advised to consult a nutritionist or dietitian. An individualized, easy-to-manage diet plan can be set up for each patient. Both the American Diabetes Association and the American Dietetic Association recommend **diets** based on the use of food exchange lists. Each food exchange contains a known amount of calories in the form of protein, fat, or carbohydrate. A patient's diet plan will consist of a certain number of exchanges from each food category (meat or protein, fruits, breads and starches, vegetables, and fats) to be eaten at meal times and as snacks. Patients have flexibility in choosing the foods they eat as long as they do not exceed the number of exchanges prescribed. The food exchange system, along with a plan of moderate exercise, can help diabetics lose excess weight and improve their overall health. Certain foods will be emphasized over others to promote a healthy heart as well.

Supplements

Supplement use to control blood glucose levels is controversial, as many studies have either produced conflicting results or have been done using such a small number of patients that their general validity can be questioned. Patients should be sure to inform their healthcare provider of all herbal and dietary supplements and over-the-counter medications that they are taking because these remedies may enhance or diminish the effects of conventional drugs used to treat diabetes.

CHROMIUM PICOLINATE. Several studies have had conflicting results on the effectiveness of **chromium** picolinate supplementation for control of blood glucose levels. In one study, approximately 70% of the diabetics receiving 200 micrograms of chromium picolinate daily reduced their need for insulin and medications. While some studies have shown that supplementation caused significant weight loss and decreases in blood glucose and serum triglycerides, others have shown no benefit. Chromium supplementation may cause hypoglycemia and other side effects.

MAGNESIUM. **Magnesium** deficiency may interfere with insulin secretion and uptake and worsen the patient's control of blood sugar. Also, magnesium deficiency puts diabetics at risk for certain complications, especially **retinopathy** and cardiovascular disease.

VANADIUM. **Vanadium** has been shown to bring blood glucose to normal levels in diabetic animals. In human studies, people who took vanadium were able to decrease their need for insulin.

Traditional Chinese medicine

In one study, non-insulin dependent diabetics who practiced daily **qigong** for one year had decreases in fasting blood glucose and blood insulin levels. Qigong also provides general health benefits.

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Acupuncture may relieve pain in patients with diabetic neuropathy, a condition in which the nerves of the spinal column degenerate due to diabetes. Some studies have suggested that acupuncture also may help to bring blood glucose to normal levels in diabetics who do not require insulin.

When used in consultation with a **traditional Chinese medicine** practitioner, some traditional Chinese herbal medicines are believed to alleviate symptoms of or complications from diabetes. However, none of these treatments eliminates the need for insulin in people with type 1 diabetes or weight and diet control (and possibly medications) in people with type 2 diabetes. These traditional Chinese medicines include:

- Xiao Ke Wan (Emaciation and Thirst Pill) for diabetics with increased levels of sugar in blood and urine.
- Yu Quan Wan (Jade Spring Pill) for diabetics with a deficiency of Yin.
- Liu Wei Di Huang Wan (Six Ingredient Pill with Rehmannia) for stabilized diabetics with a deficiency of Kidney Yin.
- Jin Gui Shen Wan (Kidney Qi Pill) for stabilized diabetics with a deficiency of Kidney Yang.

Herbs

Herbal medicines can have a positive effect on blood glucose and quality of life in diabetics. Herbs recommended by herbal practitioners to help control blood glucose levels include the following:

- ginseng (genus *Panax*), shown to moderately lower blood glucose levels in several well-designed clinical trials
- wormwood (*Artemisia herba-alba*), shown to decreased blood glucose
- gurmar (*Gymnema sylvestre*), thought to decrease blood glucose levels and the need for insulin
- *Coccinia indica*, believed to improved glucose tolerance
- fenugreek seed powder (*Trigonella foenum graecum*) shown to decrease blood glucose and improved glucose tolerance
- bitter melon (*Momordica charantia*) believed to decrease blood glucose and improved glucose tolerance
- cayenne pepper (*Capsicum frutescens*) to help relieve pain in the peripheral nerves (a type of diabetic neuropathy)

Other herbals that may treat or prevent diabetes and its complications include the following:

- bilberry (*Vaccinium myrtillus*) may lower blood glucose levels and maintain healthy blood vessels
- garlic (*Allium sativum*) may lower blood sugar and cholesterol levels
- onions (*Allium cepa*) may help lower blood glucose levels
- ginkgo (*Ginkgo biloba*) may improve blood circulation

Yoga

Studies of diabetics have shown that practicing **yoga** leads to decreases in blood glucose, increased glucose tolerance, decreased need for diabetes medications, and improved insulin processes. Yoga also enhances the sense of wellbeing and improves circulation and flexibility.

Biofeedback

Many studies have been performed to test the benefit of adding **biofeedback** to the diabetic's treatment plan. **Relaxation** techniques, such as visualization, usually were included. Biofeedback can have significant effects on diabetes, including improved glucose tolerance and decreased blood glucose levels. In addition, biofeedback can be used to treat diabetic complications and improve quality of life.

Allopathic treatment

Traditional treatment of diabetes begins with a well balanced diet and moderate exercise. Medications are prescribed only if the patient's blood glucose cannot be controlled by these methods.

Oral medications

Oral prescription medications are available to lower blood glucose in type 2 diabetics. Drugs first prescribed for type 2 diabetes are in a class of compounds called sulfonylureas and include tolbutamide, tolazamide, acetohexamide, chlorpropamide, glyburide, glimeperide, and glipizide. The way that these drugs work is not well understood; they seem to stimulate cells of the pancreas to produce more insulin. Other drugs available to treat diabetes include metformin, acarbose, and troglitizone. These medications are not a substitute for a well-planned diet and moderate exercise. Oral medications are not effective for type 1 diabetes, in which the patient produces little or no insulin.

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Insulin

Patients with type 1 diabetes need daily injections of insulin to help their bodies use glucose. Some patients with type 2 diabetes may need to use insulin injections if their diabetes cannot be controlled. Injections are given subcutaneously—just under the skin, using a small needle and syringe. Insulin comes in many forms, including rapid-acting, short-acting, intermediate-acting, long-acting, and pre-mixed (several types in a specific ratio) insulin. Synthetic human insulin is commonly considered superior to bovine (cow) or porcine (pig) insulin. The type of insulin used varies with the age, health, and lifestyle of each diabetic. Different types of insulin can be mixed and given in one dose or split into two or more doses during a day. Patients who require multiple injections over the course of a day may be able to use an insulin pump that administers small doses of insulin on demand.

New drugs and new drug delivery systems to treat diabetes were active areas of research as of 2008. For example, in 2004, the United States Food and Drug Administration (FDA) approved a rapid-acting form of synthetic insulin, insulin glulisine (Apidra), to control hyperglycemia following meals. In 2007, the FDA approved a new delivery system for insulin glargine (Lantus) called LantusSoloStar, which consists of individual pre-loaded insulin pens to be used once daily at bedtime. Because the number of individuals with diabetes was expected to rise substantially between 2008 and 2018, research on new drugs, delivery systems, and blood glucose test kits is likely to remain vigorous.

Hypoglycemia, or low blood sugar, is a condition that can be caused by too much insulin, eating too little food, eating too late to coincide with the action of the insulin, alcohol consumption, or increased exercise. A patient with symptoms of hypoglycemia may be hungry, sweaty, shaky, cranky, confused, and tired. Left untreated, the individual can lose consciousness or have a seizure. This condition is sometimes called an insulin reaction or "insulin shock" and should be treated by giving the individual something sweet to eat or drink such as candy, sugar cubes, or juice.

Surgery

Transplantation of a healthy pancreas into a person with type 1 diabetes might seem like a successful treatment. Nevertheless, this transplant usually is done only if a kidney transplant is performed at the same time. Transplanted pancreases are rejected about half the time, so in many cases the potential benefits of transplantation are overshadowed by the risks of the surgery and subsequent immune system drug therapy.

Expected results

Individuals who can control their diabetes and keep their blood glucose levels constant within a normal range can, with care, lead a relatively healthy, normal life. Some diabetics have even been successful in playing professional sports (Bobby Clark, hockey player for the Philadelphia Flyers was one of the first professional sports figures to publicly discuss his diabetes). Uncontrolled diabetes is a leading cause of blindness, end-stage renal disease, and limb amputations. It also doubles the risk of heart disease and increases the risk of stroke. Eye problems, including **cataracts**, **glaucoma**, and retinopathy, also are more common in diabetics. Kidney disease is a common complication of diabetes and may require kidney dialysis or a kidney transplant. Babies born to diabetic mothers have an increased risk of birth defects and distress at birth.

Diabetic **peripheral neuropathy** is a condition in which nerve endings, particularly in the legs and feet, become less sensitive. Diabetic foot ulcers are a common problem since the patient does not feel the pain of a blister, callous, or other minor injury. Poor blood circulation in the legs and feet then contributes to slowing wound healing. The inability to sense pain along with the complications of delayed wound healing can result in minor injuries, **blisters**, or **calluses** becoming infected and difficult to treat. Severely infected tissue breaks down and rots, often necessitating amputation of toes, feet, or legs.

Prevention

Research continues on ways to prevent diabetes and to detect those at risk for developing diabetes. While the onset of type 1 diabetes is unpredictable, the risk of developing type 2 diabetes can be reduced by losing excess weight, exercising regularly, and eating a diet low in calories and high in fruits, vegetables, and whole grains. The Diabetes Prevention Program, a large well-designed clinical trial, found that people with pre-diabetes were substantially less likely to develop diabetes if they lost weight and exercised 150 minutes per week. People taking metformin (Glucophage) without lifestyle changes also reduced their

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KEY TERMS

Body Mass Index (BMI)—A measurement of fatness that compares height to weight.

Cataracts—A condition in which the lens of the eye becomes cloudy.

Diabetic peripheral neuropathy—Dulled sensitivity of nerves to pain, temperature, and pressure particularly in the legs and feet.

Diabetic retinopathy—The tiny blood vessels to the retina, the tissues that sense light at the back of the eye, are damaged, leading to blurred vision, sudden blindness, or black spots, lines, or flashing light in the field of vision.

Glaucoma—A condition in which pressure within the eye causes damage to the optic nerve, which sends visual images to the brain.

Hyperglycemia—A condition of having too much glucose or sugar in the blood.

Hypoglycemia—A condition of having too little glucose or sugar in the blood.

Insulin—A hormone produced by the pancreas that is needed by cells of the body to use glucose (sugar), the body's main source of energy.

Ketoacidosis—A condition due to starvation or uncontrolled type 1 diabetes. Ketones are acid compounds that form in the blood when the body breaks down fats and proteins. Symptoms include abdominal pain, vomiting, rapid breathing, extreme tiredness, and drowsiness.

Kidney dialysis—A process by which blood is filtered through a dialysis machine to remove waste products that would normally be removed by the kidneys. The filtered blood is then circulated back into the patient; also called renal dialysis.

Pancreas—An organ located near the liver that produces the hormones insulin, glucagon, and somatostatin as well as digestive enzymes.

chance of developing diabetes, but less so than those who changed their eating and exercise habits.

The physical and emotional stress of surgery, illness, and alcoholism can increase the risks of diabetes, so stress reduction and maintaining a healthy lifestyle is important in preventing the onset of type 2 diabetes or reducing complications of the disease.

In early 2002, researchers announced that patients at high risk for developing diabetes who took an ACE inhibitor called ramipril (Altace) reduced their risk of developing diabetes by 30%. However, a large clinical trial reported in 2006 found that people who had impaired fasting glucose levels or impaired glucose tolerance and who used ramipril for three years developed diabetes and died at the same rate as people who did not take the drug, although of those people who did not develop diabetes, more returned to normal blood sugar levels while taking ramipril. These mixed results leave the effects of ACE inhibitors on diabetes unclear and open to more research as of 2008.

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Alternative Therapies Magazine. PO Box 627, Holmes, PA 19043-9650. http://www.alternative-therapies.com/.

ORGANIZATIONS

Alternative Medicine Foundation, PO Box 60016, Potomac, MD, 20859, (301) 340-1960 http://www.amfoundation.org.

American Diabetes Association, 1701 North Beauregard Street, Alexandria, VA, 22311, (800) 342-2383 http://www.diabetes.org.

American Dietetic Association, 120 South Riverside Plaza, Suite 2000, Chicago, IL, 60606-6995, (800) 877-1600 http://www.eatright.org.

American Holistic Medical Association, PO Box 2016, Edmonds, WA, 98020, (425) 967-0737 http://www.holisticmedicine.org.

Juvenile Diabetes Research Foundation International, 120 Wall Street, New York, NY, 10005-4001, (800) 533-2873 http://www.jdrf.org.

National Diabetes Information Clearinghouse, 1 Information Way, Bethesda, MD, 20892-3560, (800) 860-8747 http://diabetes.niddk.nih.gov.

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Diamond diet

Definition

The Diamond diet, popularly known as the Fit for Life Program, is a way of eating designed to be employed as a health lifestyle. Developed by Harvey and Marilyn Diamond, it is a set of dietary principles intended to serve as a blueprint for habits that can easily become routine, allowing individuals to take control of their health.

Origins

Harvey Diamond was an ill and underweight child with chronic and painful stomach problems. As a young adult, his health problems continued as he became overweight. After experiencing the dieting merry-go-round of losing and regaining his weight, Diamond decided that dieting does not work and that he needed to learn how to best care for his body. In 1970, Diamond found his answer in the concept of natural hygiene, an approach to the care and upkeep of the body that focuses on prevention of disease and healthful living. As described by Diamond, the concept of natural hygiene teaches that the body is self-cleansing, self-healing, and self-maintaining. Healing powers are contained within the body itself. He states "the body is always striving for health and . . . achieves this by continuously cleansing itself of deleterious waste material." In combination with an overall healthful lifestyle of adequate rest, **exercise**, sunshine, **stress** management, and interpersonal relationships, understanding how food impacts this cleansing process allows individuals to eliminate the cause of their health problems.

Almost immediately upon Diamond's introduction to this concept, his lifelong stomach pains ceased. Within one month, he had lost 50 pounds (a loss he was able to maintain). Diamond became a proponent of natural hygiene and, in 1981, began a seminar program known as The Diamond Method. In 1983, he earned a doctorate in nutritional science from the American College of Health Science, a non-accredited college in Austin, Texas. It is the basic fundamentals of natural hygiene that Harvey and Marilyn Diamond synthesized into the dietary and lifestyle principles of the Fit for Life Program.

Benefits

Although popularly discussed as a weight loss program, Fit for Life is not a diet. True to the tenets of natural hygiene, the approach to eating laid out in the Fit for Life books is designed to provide for optimal body functioning by internal cleansing of illness-producing toxins. Although weight loss and energy enhancements are positive results, the underlying goal is cleansing. Disease, as understood in this approach, is "nothing more than the body's own effort to cleanse itself of toxins." These toxins are the products of metabolic imbalance, or toxemia, resulting from wastes. Dead cells, food residue, and additives build up in the bodies and cannot be eliminated at the same rate they are produced. Understanding and minimizing this level of toxemia is the key to healthy longevity. The dietary guidelines of the Fit for Life program are designed to generate a minimum of toxic food residue within the body and to enable the body to continuously expel the toxic waste that is produced. An additional intent is that the dietary guidelines incorporate good food and enjoyable meals rather than strict, hard-to-follow regimens. If the program is stopped for any reason, according to Diamond, it can be re-started with almost immediate results.

Description

The Fit for Life program places an emphasis not only on what foods are eaten, but also in what combinations and at what time of day those foods are eaten. Three general principles guide Diamond's hygienic approach to eating.

The Principle of High-Water-Content Food

Water is vital to cleansing the inside of the body of accumulated wastes. Consuming sufficient high-water-content foods, fruits, and vegetables is crucial to accomplish this cleansing. Unlike drinking water, the water found in fruits and vegetables provides for the transport of the nutrients found in those foods. It then flushes waste matter from the body.

The Principle of Proper Food Combining

According to this principle, foods should be eaten in combinations that are most compatible with

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digestive chemistry. Otherwise, the food will remain in the stomach longer than it should and cause digestive problems. Proteins and starches should not be eaten together because the stomach cannot digest both efficiently at the same time. For optimal digestion, proteins should be combined with vegetables at mealtime or a starch combined with vegetables.

The Principle of the Correct Consumption of Fruit

Fruit should be fresh and ripe when eaten. It should be eaten alone on an empty stomach, not with or after anything else. The reason is that fruit requires no digestion in the stomach and should be able to pass through the stomach quickly to help the body in its **detoxification** efforts. Additionally, because fruit requires so little digestive energy, it should be eaten in the morning to best work with natural body cycles of food utilization and elimination. The body needs to spend its energy on proper cleansing during the morning hours rather than diverting crucial energy to digestive processes. According to Diamond, the most beneficial habit a person can develop is consuming exclusively fresh fruit and fresh fruit juice from awakening until noon.

Research and general acceptance

Proponents, including some **nutrition** and medical professionals, claim benefits include weight loss, improved energy, and overall better health from following the program. Medical doctors, including Edward Taub, an Assistant Clinical Professor at the University of California, Irvine, and Kay S. Lawrence, contributed to the first Fit for Life book. Critics contend that the principles of the program disagree with much established nutritional advice such as that provided by the American Dietetic Association (ADA). The regimen does not, for example, advocate weight loss by counting calories, recommend the basic food groups, or call to attention the health benefits of milk. Although the emphasis on fresh fruits and vegetables is generally seen as positive, it is also called extreme by some reviewers. Reviewers in nutritional publications have raised concerns about inadequate protein intake, the possibility of deficiencies in **calcium**, **zinc**, some B vitamins (notably **riboflavin** and **thiamine**), and **iron** deficiency **anemia**. Some nutritionists have also argued that rigorously following the Fit for Life dietary guidelines could lead to inadequate nutrition for the proper development of growing children or fetuses. Critical reviews range from Environmental Nutrition's assessment that the Fit for Life regimen is "probably not dangerous, [but] has the potential to be unhealthy and therefore is not recommended" to the position of J. Lynne Brown, Ph.D., R.D. that if "followed rigorously, it could lead to serious health problems." Diamond rebuffs his critics, ADA guidelines and nutritional advice in particular, calling for a broader understanding of science, a quest for truth and less emphasis on credentials which are, he argues, the way organizations such as the ADA maintain power over dissenting opinions.

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American Dietetic Association. 216 Jackson Blvd., Chicago, Illinois 60606. (312) 899-0040. adaf@eatright.org. http://www.eatright.org.

American Natural Hygiene Society. P.O. Box 30630, Tampa, FL 33630. (813) 855-6607. anhs@anhs.org. http://www.anhs.org/index.html.

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Kathy Stolley

Diaper rash

Definition

Dermatitis of the buttocks, genitals, lower abdomen, or thigh folds of an infant or toddler is commonly referred to as diaper rash.

Description

The outside layer of skin normally forms a protective barrier that prevents infection. One of the primary causes of dermatitis in the diaper area is prolonged skin contact with wetness. Under these circumstances, natural oils are stripped away, the outer layer of skin is damaged, and there is increased susceptibility to infection by bacteria or yeast.

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Male baby with severe diaper rash. *(Custom Medical Stock Photo. Reproduced by permission.)*

Diaper rash is a term that covers a broad variety of skin conditions that occur on the same area of the body. Some babies are more prone to diaper rash than others.

Causes and symptoms

Frequently, a flat, red rash is caused by simple chafing of the diaper against tender skin, initiating a friction rash. This type of rash is not seen in the skin folds. It may be more pronounced around the edges of the diaper, at the waist and leg bands. The baby generally does not appear to experience much discomfort. Sometimes the chemicals or detergents in the diaper are contributing factors and may result in **contact dermatitis**. These **rashes** should clear up easily with proper attention. Ignoring the condition may lead to a secondary infection that is more difficult to resolve.

Friction of skin against itself can cause a rash in the baby's skin folds, called intertrigo. This rash appears as reddened areas that may ooze, and is often uncomfortable when the diaper is wet. Intertrigo can also be found on other areas of the body where there are deep skin folds that tend to trap moisture.

Seborrheic dermatitis is the diaper area equivalent of **cradle cap**. It is scaly and greasy in appearance and may be worse in the folds of the skin.

Yeast, or candidal dermatitis, is the most common infectious cause of diaper rash. The affected areas are raised and quite red with distinct borders, and satellite lesions may occur around the edges. Yeast is part of the normal skin flora, and is often an opportunistic invader when simple diaper rash is untreated. It is particularly common after treatment with antibiotics, which kill the good bacteria that normally keep the yeast population in check. Usual treatments for diaper rash will not clear it up. Repeated or difficult to resolve episodes of **yeast infection** may warrant further medical attention, since this is sometimes associated with diabetes or immune problems.

KEY TERMS

Dermatitis—Inflammation of the skin.

Another infectious cause of diaper rash is **impetigo**. This bacterial infection is characterized by **blisters** that ooze and crust.

Diagnosis

The presence of skin lesions in the diaper area means that the baby has diaper rash. However, there are several types of rash that may require specific treatment in order to heal. It is useful to be able to distinguish them by appearance.

A baby with a rash that does not clear up within two to three days, or a rash with blisters or bleeding, should be seen by a healthcare professional for further evaluation.

Treatment

Good diaper hygiene will prevent or clear up many simple cases of diaper rash. Diapers should be checked very frequently and changed as soon as they are wet or soiled. Good air circulation is also important for healthy skin. Babies should have some time without wearing a diaper, and a waterproof pad can be used to protect the bed or other surface. Rubber pants, or other occlusive fabrics, should not be used over the diaper area. Some cloth-like disposable diapers promote better air circulation than plastic-type diapers. It may be necessary for mothers to experiment with diaper types to see if the baby's skin reacts better to cloth or disposable ones. If disposable diapers are used, the baby's skin may react differently to various brands. If the baby is wearing cloth diapers, they should be washed in a mild detergent and double rinsed.

The diaper area should be cleaned with something mild, even plain water. Some wipes contain alcohol or chemicals that can be irritating for some babies. Plain water may be the best cleansing substance when there is a rash. Using warm water in a spray bottle (or giving a quick bath) and then lightly patting the skin dry can produce less skin trauma than using wipes. In the event of suspected yeast, a tablespoon of cider vinegar can be added to a cup of warm water and used as a cleansing solution. This is dilute enough that it should

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not burn, but acidifies the skin pH enough to hamper the yeast growth.

Barrier ointments can be valuable to treat rashes. Those that contain zinc oxide are especially effective. These creams and ointments protect already irritated skin from the additional insult of urine and stool, particularly if the baby has **diarrhea**. Cornstarch powder may be used on rashes that are moist, such as impetigo.

Nutrition

What the baby eats can make a difference in stool frequency and acidity. Typically, breast-fed babies will have fewer problems with rashes. When adding a new food to the diet, the baby should be observed closely to see whether rashes are produced around the baby's mouth or anus. If this occurs, the new food should be discontinued.

Babies who are taking antibiotics are more likely to get rashes due to yeast. To help bring the good bacterial counts back to normal, *Lactobacillus bifidus* can be added to the diet. It is available in powder form from most health food stores.

Herbal treatment

Some herbal preparations can be useful for diaper rash. **Calendula** reduces inflammation, tightens tissues, and disinfects. It has been recommended for seborrheic dermatitis as well as for general inflammation of the skin. The ointment should be applied at each diaper change. **Chickweed** ointment can also be soothing for irritated skin and may be applied once or twice daily.

Allopathic treatment

Antibiotics are generally prescribed for rashes caused by bacteria, particularly impetigo. This may be a topical or oral formulation, depending on the size of the area involved and the severity of the infection.

Over-the-counter antifungal creams, such as Lotrimin, are often recommended to treat a rash resulting from yeast. If topical treatment is not effective, an oral antifungal may be prescribed.

Mild steroid creams, such as 0.5-1% hydrocortisone, can be used for seborrheic dermatitis and sometimes intertrigo. Prescription strength creams may be needed for short-term treatment of more stubborn cases.

Expected results

Treated appropriately, diaper rash will resolve fairly quickly if there is no underlying health problem or skin disease.

Prevention

Frequent diaper changes are important to keep the skin dry and healthy. Application of powders and ointments is not necessary when there is no rash. Finding the best combination of cleansing and diapering products for the individual baby will also help to prevent diaper rash.

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Judith Turner

Diarrhea

Definition

To most persons, diarrhea means an increased frequency or softer consistency of bowel movements. The medical definition specifies that diarrhea correlates with an increase in stool weight; stool weights above 300 g per day generally indicate diarrhea. This is mainly due to excess water, which normally makes up 60 to 85% of fecal matter. In this way, true diarrhea is distinguished from diseases that cause only an increase in the number of bowel movements (hyperdefecation) or incontinence (involuntary loss of bowel contents).

Diarrhea is also classified by physicians into acute, which lasts one to two weeks, and chronic, which continues for longer than 23 weeks. Viral and bacterial **infections** are the most common causes of acute diarrhea.

Description

In many cases, acute infectious diarrhea is a mild, limited annoyance. However, acute infectious diarrhea has a huge impact worldwide, causing more than five million deaths per year. While most deaths are among children under five years of age in developing nations, the impact, even in developed countries, is considerable. For example, over 250,000 persons are admitted to hospitals in the United States each year

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Causes of diarrhea

Causes	Examples
Viral infections	Rotavirus, Norwalk virus
Bacterial infections	*E. coli, Vibrio cholerae, Campylobacter, Shigella*
Parasites	*Giardia, Entamoeba*
Helminths (intestinal worms)	Strongyloides
Allergic	Lactose intolerance, celiac sprue, medication side effects
Autoimmune	Ulcerative colitis, Crohn's disease
Malabsorptive	Pancreatic deficiency, biliary disease
Nutritional	Zinc deficiency, vitamin A deficiency, enteral feedings consisting of liquid nutritional formulas delivered straight to the bowels
Functional	Irritable bowel syndrome, short bowel syndrome, cancer

(Illustration by GGS Information Services. Cengage Learning, Gale)

because of diarrhea. Rapid diagnosis and proper treatment can prevent much of the suffering associated with this illness.

Chronic diarrhea also has a considerable effect on health, as well as on social and economic well being. Patients with **celiac disease**, **inflammatory bowel disease**, and other prolonged diarrheal illnesses develop nutritional deficiencies, which diminish growth and immunity. They affect social interaction and result in the loss of many working hours.

Causes and symptoms

Diarrhea occurs because more fluid passes through the large intestine (colon) than can be absorbed. As a rule, the colon can absorb several times more fluid than is required on a daily basis. However, when this reserve capacity is overwhelmed, diarrhea occurs.

Diarrhea is caused by infections or illnesses that either lead to excess production of fluids or prevent absorption of fluids. Also, certain substances in the colon, such as fats and bile acids, can interfere with water absorption and cause diarrhea. In addition, rapid passage of material through the colon can cause diarrhea.

Symptoms related to diarrheal illness are often those associated with any injury to the gastrointestinal tract, such as **fever**, **nausea**, **vomiting**, and abdominal **pain**. All or none of these may be present depending on the cause of diarrhea. The number of bowel movements can vary with up to 20 or more per day. In some patients, blood or pus is present in the stool. Bowel movements may contain undigested food material.

The most common causes of acute diarrhea are infections (the cause of traveler's diarrhea), **food poisoning**, and medications. Medications are a frequent and often overlooked cause, especially antibiotics and antacids. Both prescription and over-the-counter medications can contain additives, such as lactose and sorbitol, that will produce diarrhea in sensitive persons. Less often, various sugar-free foods, which sometimes contain poorly absorbable materials, cause diarrhea. Review of **allergies** or skin changes may also point to a cause.

Rotavirus is a common cause of diarrhea in children. A study performed at the Baylor College of Medicine in Houston, Texas, found that children who have rotavirus in their intestine have a high likelihood of the presence of the disease in their bloodstream.

Chronic diarrhea is frequently due to many of the same conditions that cause the shorter episodes (e.g., infections, medications); symptoms just last longer. Some infections can become chronic. This occurs mainly with **parasitic infections** (such as *Giardia*) or in cases in which patients have altered immunity (such as **AIDS**).

The following are the more usual causes of chronic diarrhea:

- AIDS
- colon cancer and other bowel tumors
- endocrine or hormonal abnormalities (e.g., thyroid, diabetes mellitus)
- food allergy
- inflammatory bowel disease, or IBD (Crohn's disease and ulcerative colitis)
- lactose intolerance
- malabsorption syndromes (celiac and Whipple's disease)
- other (alcohol, microscopic colitis, radiation, surgery)

Complications

The major effects of diarrhea are dehydration, malnutrition, and weight loss. Signs of dehydration can be hard to notice but include thirst, **dry mouth**, weakness or lightheadedness (particularly if worsening on standing), urine darkening, or a decrease in urination. Severe dehydration leads to changes in the body's chemistry and could become life-threatening. Dehydration from diarrhea can result in kidney failure, neurological symptoms, arthritis, and skin problems. Dehydration in chronic diarrhea, such as that associated with inflammatory bowel disease, increases a person's risk for **kidney stones**.

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Diagnosis

Most cases of acute diarrhea never need diagnosis or treatment, as many are mild and produce few problems. Patients with fever over 102°F (38.9°C), signs of dehydration, bloody bowel movements, severe abdominal pain, known immune disease, or recent use of antibiotics need prompt medical evaluation.

When diagnostic studies are needed, the most useful are stool culture and examination for parasites; however, these are often negative and a cause cannot be found in a large number of patients. The earlier cultures are performed, the greater the chance of obtaining a positive result. Stool samples of patients who had used antibiotics in the preceding two months need to be examined for the toxins that cause antibiotic-associated **colitis**. Tests are also available to check stool samples for microscopic amounts of blood and for cells that indicate severe inflammation of the colon. Examination with an endoscope is sometimes helpful in determining severity and extent of inflammation. Tests to check changes in blood chemistry (e.g., **potassium**, **magnesium**) and a complete blood count (CBC) may be performed.

Chronic diarrhea is quite different, and most patients with this condition will receive some degree of testing. Many exams are the same as for an acute episode, as some infections and parasites cause both types of diarrhea. A careful history to evaluate medication use, dietary changes, family history of illnesses, and other symptoms is necessary. Key points in determining the seriousness of symptoms are weight loss of over 10 lb (4.5 kg), blood in the stool, and nocturnal diarrhea (symptoms that awaken the patient from sleep). A combination of stool, blood, and urine tests may be needed in the evaluation of chronic diarrhea; in addition a number of endoscopic and x-ray studies are frequently required.

In some cases, appendectomy leads to a diagnosis of inflammatory bowel disease. The specimen removed during the procedure may contain signs of the disorder and may be the first clue that a patient has IBD.

Treatment

Diet

Treatment is ideally directed toward correcting the cause; however, the first aim is to prevent or treat dehydration and nutritional deficiencies. When possible, food intake should be continued even in patients with acute diarrhea. A physician should be consulted as to what type and how much food is permitted. Low-fat **diets** or more easily digestible fat is useful in some patients. The BRAT diet, which limits food intake to bananas, rice, applesauce, and toast, can help to resolve diarrhea. These foods provide soluble and insoluble fiber without irritation. If the toast is slightly burnt, the charcoal can help sequester toxins and pull them from the body.

The patient should drink plenty of fluids; however, in severe cases hospitalization to provide intravenous fluids may be necessary. A physician should be notified if the patient is dehydrated, and if oral replacement is suggested then commercial (Pedialyte and others) or homemade preparations can be used. The World Health Organization (WHO) has provided this easy recipe for home preparation, which can be taken in frequent small sips:

- table salt: 3/4 teaspoon
- baking powder: 1 teaspoon
- orange juice: 1 cup
- water: 1 quart or liter.

Supplements

Nutrient replacement also plays a role in preventing and treating diarrhea. **Zinc** especially appears to have an effect on the immune system, and deficiency of this mineral can lead to chronic diarrhea. Also, zinc replacement improves growth in young patients.

Dietary supplements that are generally beneficial in the treatment of digestive disorders include the following:

- vitamin C: 50-500 mg daily
- vitamin B_6: 50 to 150 mg daily
- magnesium aspartate: 400 mg daily
- vitamin E: 400 IU daily
- glutamine: 3,000 mg daily
- garlic, deodorized: 2,000 mg daily
- deghycirrhizinated licorice: chew as needed

Studies conducted at the Children's Hospital Oakland Research Institute (Oakland, California) and at the Heinrich Heine University (Dusseldorf, Germany), found that cocoa flavonoids in dark chocolate can limit the amount of fluid in the intestine, possibly relieving diarrhea. More research in the area was needed as of 2008; however, scientists noted that using chocolate as a diarrhea treatment dates back hundreds of years, although the mechanism was not known.

Probiotics

Probiotics refers to treatment with beneficial microbes either by ingestion or from a suppository. Studies and the clinical use of probiotics have shown

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their utility in the resolution of diarrhea, especially antibiotic-associated diarrhea. Beneficial microbes include the bacteria *Lactobacillus acidophilus* and *L. bifidus* and the yeast *Saccharomyces boulardii*. To treat diarrhea, the patient can eat one cup of yogurt (containing active *Lactobacillus acidophilus* cultures) daily. Alternatively, one or two **acidophilus** capsules may be taken at each meal or at bedtime.

Researchers at Ohio State University found that treatment with probiotics lessened the chance of diarrhea in persons taking antibiotics. In the study, diarrhea was experienced by 20% of individuals not taking the probiotics. Only 8% of individuals taking probiotics had diarrhea.

Acupuncture

Shallow **acupuncture**, when the needles are inserted superficially and rapidly removed, was more therapeutic than drugs in children with acute or chronic diarrhea. In another study, acupuncture eliminated symptoms and normalized stools in children with chronic diarrhea who had not responded to conventional or Chinese medicines.

Herbals and Chinese medicines

Herbal remedies for diarrhea include meadowsweet, **goldenseal**, and **chamomile** taken as an infusion throughout the day.

Chinese patent medicines used for treating diarrhea include the following:

- Xiang Sha Liu Jun Wan (Six-Gentlemen Pill with Aucklandia and Amomum)
- Fu Zi Li Zhong Wan (Prepared Aconite Pill to Regulate the Middle)
- Si Shen Wan (Four-Miracle Pill)
- Wu Mei Wan (Mume Pill)
- Jian Pi Wan (Strengthen the Spleen Pill)
- Shen Ling Bai Zhu Wan (Ginseng, Poria, and Atractylodes Macrocephala Pill)

Allopathic treatment

Anti-motility agents, such as loperamide (Imodium AD) and diphenoxylate are useful for persons with chronic diarrhea; their use is limited or even contraindicated in patients with acute diarrhea, especially in those with high fever or bloody bowel movements. They should not be taken without the advice of a physician. Other treatments that are available, depending on the cause of diarrhea, include the bulk agent **psyllium** and the binder cholestyramine. Also, new antidiarrheal drugs that decrease excessive secretion of fluid by the intestinal tract are available.

A University of Tennessee study found promising results in treating certain types of traveler's diarrhea with the antibiotic Rifximin (Xafaxan). In the study, travelers to Mexico and Kenya who experienced traveler's diarrhea reduced the duration of the loose stools. The drug was found to be effective for certain strains of *E. coli* but is not effective if fever is present or if the stool contains blood.

KEY TERMS

Anti-motility medications—Medications such as loperamide (Imodium), diphenoxylate (Lomotil), or medications containing codeine or narcotics that decrease the ability of the intestine to contract. These can worsen the condition of a patient with dysentery or colitis.

Colitis—Inflammation of the colon.

Endoscope—A thin flexible tube with a lens or miniature camera that allows a doctor to view various internal organs, including the gastrointestinal tract. Both diagnosis and therapeutic procedures can be done with this instrument.

Endoscopy—The performance of an exam using an endoscope.

Lactose intolerance—An inability to properly digest milk and dairy products.

Probiotics—The use of beneficial microbes to treat various diseases, including diarrhea.

Rotavirus—The primary infectious cause of diarrhea in infants and children.

Expected results

Prognosis is related to the cause of the diarrhea; for most individuals in developed countries, a bout of acute, infectious diarrhea is at best uncomfortable. However, in both industrialized and developing areas, serious complications and death can occur.

Prevention

Proper hygiene and food handling techniques will prevent many cases. Traveler's diarrhea can be avoided by use of Pepto-Bismol and/or antibiotics, if necessary. The most important action is to prevent dehydration.

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World Health Organization (WHO), CH-1211, Geneva 27, Switzerland, +41 22 791 2111 http://www.who.ch.

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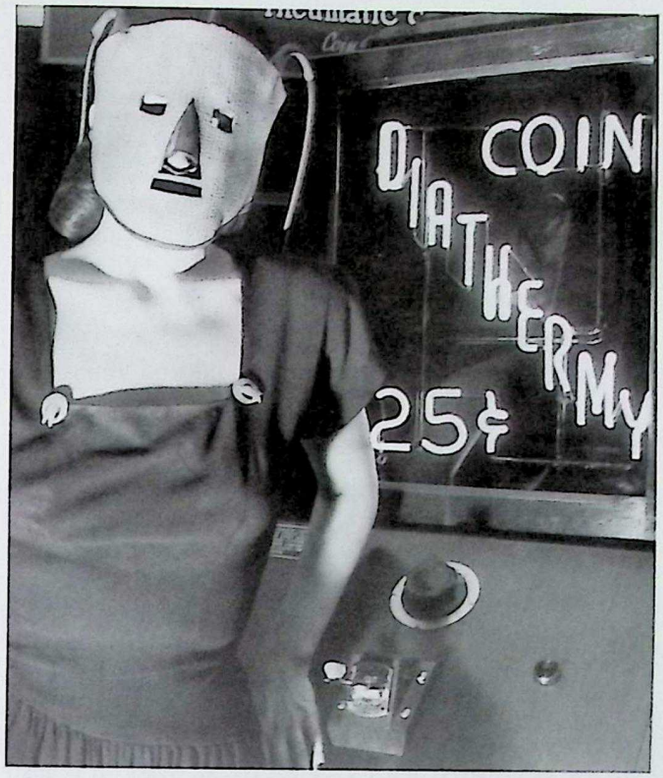

It was once planned to erect diathermy machines like the one in this photo in New York in 1946. In diathermy, high-frequency electrical currents are used to heat deep muscular tissues. *(Black Star / Alamy)*

Diathermy

Definition

In diathermy, high-frequency electrical currents are used to heat deep muscular tissues. The heat increases blood flow, speeding up recovery. Doctors also use diathermy in surgical procedures by sealing blood vessels with electrically heated probes.

The term diathermy is derived from the Greek words *therma,* meaning heat, and *dia,* meaning through. Diathermy literally means heating through.

Origins

The therapeutic effects of heat have long been recognized. More than 2,000 years ago, the Romans took advantage of heat therapies by building hot-spring bathhouses. Since then, various methods of using heat have evolved. In the early 1890s, French physiologist Arsène d'Arsonval began studying the medical application of high-frequency currents. The term diathermy was coined by German physician Carl Franz Nagelschmidt, who designed a prototype apparatus in 1906. Around 1925, United States doctor J. W. Schereschewsky began studying the physiological effects of high-frequency electrical currents on animals. It was several years, however, before the fundamentals of the therapy were understood and put into practice.

Benefits

Diathermy can be used to treat arthritis, **bursitis**, and other conditions involving stiff, painful joints. It is also used to treat pelvic **infections** and sinusitis. A benefit of diathermy is that it is a painless procedure that can be administered at a clinic. Also, if the treatment relieves **pain**, then patients can discontinue pain killers and escape their high cost and side effects.

Description

Diathermy involves heating deep muscular tissues. When heat is applied to the painful area, cellular metabolism speeds up and blood flow increases. The increased metabolism and circulation accelerates tissue repair. The heat helps the tissues relax and stretch, thus alleviating stiffness. Heat also reduces nerve fiber sensitivity, increasing the patient's pain threshold.

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KEY TERMS

Bursitis—Pain and swelling in a joint, often the elbow, hip, knee or shoulder. In bursitis, the bursa (a sac-like membrane that acts as a pillow between the bones and tissues) becomes inflamed.

Capacitor plates—An apparatus that can carry electricity and stores an electrical charge.

Hemophilia—A blood-clotting disorder that can lead to serious hemorrhage from minor cuts and injuries.

There are three methods of diathermy. In each, energy is delivered to the deep tissues, where it is converted to heat. The three methods are:

- Shortwave diathermy. The body part to be treated is placed between two capacitor plates. Heat is generated as the high-frequency waves travel through the body tissues between the plates. Shortwave diathermy is most often used to treat areas like the hip, which is covered with a dense tissue mass. It is also used to treat pelvic infections and sinusitis. The treatment reduces inflammation. The Federal Communications Commission regulates the frequency allowed for short-wave diathermy treatment. Most machines function at 27.33 megahertz.
- Ultrasound diathermy. In this method, high-frequency acoustic vibrations are used to generate heat in deep tissue.
- Microwave diathermy. This method uses radar waves to heat tissue. This form is the easiest to use, but the microwaves cannot penetrate deep muscles.

Diathermy is also used in surgical procedures. Many doctors use electrically heated probes to seal blood vessels to prevent excessive bleeding. This is particularly helpful in neurosurgery and eye surgery. Doctors can also use diathermy to kill abnormal growths, such as tumors, **warts**, and infected tissues.

Preparations

To keep patients from sweating, patients are usually asked to remove clothing from the body part being treated. If a patient sweats, the electrical currents may pool in the area, causing **burns**. Also, clothing containing metal must be removed, as must earrings, buttons, barrettes, or zippers that contain metal. Watches and hearing aids should be removed because the therapy may affect their function.

Practitioners of surgical diathermy should steer clear of alcohol-based solutions to prepare and cleanse the skin. These preparations can create a flammable vapor and cause burns and fires.

Precautions

Patients with metal implants should not undergo diathermy treatment because the metal can act as a conductor of heat and result in serious internal burns. Female patients with metallic uterine implants, such as an IUD, should avoid treatment in the pelvic area. Diathermy should not be used in joints that have been replaced with a prosthesis or in those with sensory impairment who may not be able to tell if they are burning. Furthermore, pulsed shortwave diathermy should be avoided during **pregnancy**, as it can lead to abnormal fetal development.

Patients with hemophilia should avoid the treatment because the increased blood flow could cause them to hemorrhage.

Side effects

Some patients may experience superficial burns. Since the therapy involves creating heat, care must be taken to avoid burns, particularly in patients whose injuries have caused decreased sensitivity to heat. Also, diathermy may affect pacemaker function.

Female patients who receive treatment in the lower back or pelvic area may experience an increased menstrual flow.

Research and general acceptance

For years, physiotherapists and physical therapists have used diathermy as a routine part of physical rehabilitation.

Training and certification

It is recommended that those who treat patients with diathermy complete a course in shortwave therapy and should retake courses every five years to stay updated on procedures. Physiotherapists should also stay updated by reading appropriate medical journals.

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Lisa Frick

Diets

Definition

Humans may alter their usual eating habits for many reasons, including weight loss, disease prevention or treatment, removing toxins from the body, or to achieve a general improvement in physical and mental health. Others adopt special diets for religious reasons. In the case of some vegetarians and vegans, dietary changes are made out of ethical concerns for the rights of animals.

Origins

The practice of altering diet for special reasons has existed since antiquity. For example, Judaism has included numerous dietary restrictions for thousands of years. One ancient Jewish sect, the Essenes, is said to have developed a primitive **detoxification** diet aimed at preparing the bodies, minds, and spirits of its members for the coming of a "messiah" who would deliver them from their Roman captors. Preventative and therapeutic diets became quite popular during the late twentieth century. Books promoting the latest dietary plan continue to make the bestseller lists, although not all of the information given is considered authoritative.

Benefits

People who are moderately to severely overweight can derive substantial health benefits from a weight-loss diet. A weight reduction of just 10 to 20 lbs (5-10 kg) can result in reduced **cholesterol** levels and lower blood pressure. Weight-related health problems include **heart disease**, diabetes, high blood pressure, and high levels of blood sugar and cholesterol.

In individuals who are not overweight, dietary changes may also be useful in the prevention or treatment of a range of ailments including acquired immunodeficiency syndrome (**AIDS**), **cancer**, **osteoporosis**, **inflammatory bowel disease**, chronic pulmonary disease, renal disease, **Parkinson's disease**, seizure disorders, and food **allergies** and intolerances.

Description

The idea of a healthful diet is to provide all of the calories and nutrients needed by the body for optimal performance, at the same time ensuring that neither nutritional deficiencies nor excesses occur. Diet plans that claim to accomplish those objectives are so numerous they are virtually uncountable. These diets employ a variety of approaches, including the following:

- Fixed-menu: Offers little choice to the dieter. Specifies exactly which foods will be consumed. Easy to follow, but may be considered "boring" to some dieters.
- Formula: Replaces some or all meals with a nutritionally balanced liquid formula or powder.
- Exchange-type: Allows the dieter to choose between selected foods from each food group.
- Flexible: Doesn't concern itself with the overall diet, simply with one aspect such as fat or energy.

Diets may also be classified according to the types of foods they allow. For example, an omnivorous diet consists of both animal and plant foods, whereas a lacto-ovo-vegetarian diet permits no animal flesh, but does include eggs, milk, and dairy products. A vegan diet is a stricter form of **vegetarianism** in which eggs, cheese, and other milk products are prohibited.

A third way of classifying diets is according to their purpose: religious, weight-loss, detoxification, lifestyle-related, or aimed at prevention or treatment of a specific disease.

Precautions

Dieters should be cautious about plans that severely restrict the size of food portions, or that eliminate entire food groups from the diet. It is highly probable that they will become discouraged and drop out of such programs. The best diet is one that can be maintained indefinitely without ill effects, that offers sufficient variety and balance to provide everything needed for good health, and that is considerate of personal food preferences.

Fad diets for quick weight loss are coming under increasing fire, since dieters seldom maintain the weight loss. In 2001, researchers found that three times as many people on moderate fat weight loss diets stuck to their plan compared to those on traditional low-fat diets. Not only do many diets offer only short-term and rapid weight loss, some can be bad for the dieter's health. For instance, the American Heart Association made a statement in late 2001 questioning

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Unhealthy food additives

Name	Description	Example products
Aspartame	An artificial sweetener associated with rashes, headaches, dizziness, depression, and insomnia, and can also affect calcium metabolism	Diet sodas, sugar substitutes, gelatin desserts, low-calorie frozen desserts, etc.
Brominated vegetable oil (BVO)	Used as an emulsifier and clouding agent. Its main ingredient, bromate, is a poison.	Sodas, etc.
Butylated hydroxyanisole (BHA)/butylated hydroxytoluene (BHT)	Prevents rancidity in foods and is added to food packagings. It slows the transfer of nerve impulses, effects sleep, aggressiveness and weight in test animals, and may be carcinogenic.	Cereals, cheese packaging, chewing gum, potato chips, oils, etc.
Citrus red dye #2	Used to color the skin of oranges, it is a probable carcinogen. The FDA has recommended it to be banned.	Oranges
Monosodium glutamate (MSG)	A flavor enhancer that can cause headaches, heart palpitations and nausea.	Restaurant and fast food, processed and packaged food
Nitrates	Used as preservatives, nitrates form cancer-causing compounds in the gastrointestinal tract and have been associated with cancer and birth defects.	Cured meats and wine
Saccharin	An artificial sweetener that may be carcinogenic.	Diet sodas and sugar substitutes
Sulfites	Used as a food preservative, sulfites have been linked to at least four deaths reported to the FDA in the United States. They destroy vitamin B-1, and can also cause severe allergic reactions, especially in asthmatics.	Dried fruits, shrimp, frozen potatoes, and wine
Tertiary butyhydroquinone (TBHQ)	It is extremely toxic in low doses and has been linked to childhood behavioral problems.	Candy bars, baking sprays, butter/ margarine blends and other animal fats, and fast foods
Yellow dye #6	Increases the number of kidney and adrenal gland tumors in lab rats. It has been banned in Norway and Sweden.	Candy, sodas, gelatin, baked goods, and sausages

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the value of high-protein, low-carbohydrate diets. The association said that the diets do not work over the long term and that they can pose some health risks to dieters. In 2003, these statements were largely supported. Though clinical trials showed that these types of diets worked in lowering weight without raising cholesterol for the short-term, many of the participants gained a percentage of the weight back after only one year. A physician group also spoke out about high protein diets' dangers for people with decreased kidney function and the risk of bone loss due to decreased **calcium** intake.

Low-fat diets are not recommended for children under the age of two. Young children need extra fat to maintain their active, growing bodies. Fat intake may be gradually reduced between the ages of two and five, after which it should be limited to a maximum of 30% of total calories through adulthood. Saturated fat should be restricted to no more than 10% of total calories.

Weight-loss dieters should be wary of the "yo-yo" effect that occurs when numerous attempts are made to reduce weight using high-risk, quick-fix diets. This continued "cycling" between weight loss and weight gain can slow the basal metabolic rate and can sometimes lead to eating disorders. The dieter may become discouraged and frustrated by this success/failure cycle. The end result of yo-yo dieting is that it becomes more difficult to maintain a healthy weight.

Caution should also be exercised about weight-loss diets that require continued purchases of special prepackaged foods. Not only do these tend to be costly and over-processed, they may also prevent dieters from learning the food-selection and preparation skills essential to maintenance of weight loss. Further, dieters should consider whether they want to carry these special foods to work, restaurants, or homes of friends.

Concern has been expressed about weight-loss diet plans that do not include **exercise**, considered essential to long-term weight management. Some diets and supplements may be inadvisable for patients with special conditions or situations. In fact, use of the weight loss supplement **ephedra** was found to cause serious conditions such as **heart attack** and **stroke**. In 2004, the U.S. Food and Drug Administration (FDA) banned the sale of supplements containing ephedra. In short, most physician organizations see fad diets as distracting from learning how to achieve weight control over the long term through healthy lifestyle changes such as eating smaller, more balanced meals and exercising regularly.

Certain fad diets purporting to be official diets of groups such as the American Heart Association and the Mayo Clinic are in no way endorsed by those institutions. Patients thinking of starting such a diet should check with the institution to ensure its name has not been misappropriated by an unscrupulous practitioner.

Side effects

A wide range of side effects (some quite serious) can result from special diets, especially those that are nutritionally unbalanced. Further problems can arise if the dieter is taking high doses of dietary supplements. Food is essential to life, and improper **nutrition** can result in serious illness or death.

Research and general acceptance

It is agreed among traditional and complementary practitioners that many patients could substantially benefit from improved eating habits. Specialized diets have proved effective against a wide variety of conditions and diseases. However, dozens of unproved but widely publicized "fad diets" emerge each year, prompting widespread concerns about their usefulness, cost to the consumer, and their safety.

Training and certification

A wide variety of practitioners provide advice on dietary matters. These range from unregulated, uncertified alternative practitioners, to registered dietitians, medical doctors, and specialists. Nutritional advice can also be obtained from home economists and from college or university nutrition departments.

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ORGANIZATIONS

American Dietetic Association. 216 West Jackson Blvd., Chicago, IL 60606-6995. (312) 899-0040. http://www.eatright.org.

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Digestive enzymes

Description

Enzymes are catalysts for virtually every biological and chemical reaction in the body, and digestive enzymes are crucial for the breakdown of food into nutrients that the body can absorb. Digestive enzymes, among which are a variety are herbs, are used to treat a number of digestive problems and other conditions.

General use

Digestive enzymes are used for relief of a number of digestive symptoms and conditions:

- flatulence
- heartburn
- diarrhea
- spasms
- inflammation
- constipation
- gastroesophageal reflux
- peptic ulcers
- indigestion
- age-related digestive problems

Digestive enzymes also may be used to treat and to provide relief to other conditions, such as anorexia, **Crohn's disease**, ulcerative **colitis**, **parasitic infections**, cystic fibrosis, and **pancreatitis**. Potential systemic benefits of digestive enzymes include increasing healing and reducing water retention after surgery, reducing inflammation, enhancing the immune system, and reducing the risk of malnutrition. **Enzyme therapy** also has been shown to reduce the adverse effects of radiotherapy and chemotherapy in **cancer** treatment due to its anti-inflammatory properties.

In Europe, supplemental oral enzymes have been used as substitutes for nonsteroidal anti-inflammatory drugs to treat inflammation-related conditions such as **osteoarthritis** and **rheumatoid arthritis**.

Preparations

Pancreatin, also called pancreatinum, is an animal-based enzyme mixture of several enzymes released by the pancreas, including *proteases* to break down proteins into **amino acids**; *amylase* to break down complex carbohydrates; and *lipase* to break down lipids (fats). Pancreatin has been shown to reduce bloating, **gas**, and the feeling of fullness, particularly after eating high-fat meals.

Lactase aids the digestion of lactose (milk sugar found in dairy products) when taken just before eating lactose-containing foods. Lactase supplements are available over-the-counter in caplet and chewable tablet form and are commonly used to treat lactose intolerance. Two common brands are Lactaid and Lactrase. A variety of lactose-reduced products, such as Lactaid and Dairy Ease, are available at many grocery stores.

Beano is an over-the-counter dietary supplement that can help prevent gas by aiding the digestion of the gas-producing sugars in complex carbohydrates that are found in beans and many vegetables. The supplement is available in liquid and tablet form, and the recommended dose is five drops or one tablet taken just before eating.

Herbal preparations

Carminative herbs are considered to be mild and are rich in volatile oils, which have antibacterial properties. These herbs include **peppermint** (*Mentha spicata*), **ginger** (*Zingiber officinale*), **fennel** (*Foeniculum vulgare*), **anise** (*Pimpinella anisum*), and **lemon balm** (*Melissa officinalis*). Carminative herbs help to stimulate peristalsis, which is the wave-like action that pushes food through the digestive tract. These herbs can also help to relax the smooth muscle of the digestive tract, helping to reduce spasms. The antibacterial properties of the volatile oils aid in reducing gas pains that result from bacteria in the intestines acting on pieces of food that have not been digested fully.

Peppermint is one of the oldest medicinal herbs. Peppermint has three major actions in the body: it reduces **nausea** and **vomiting**, it encourages the liver to produce bile, and it clears the stomach of imbalanced bacteria. It is particularly useful for treating spastic colon, **irritable bowel syndrome**, and **diarrhea**. Peppermint is also useful for reducing gas **pain** and **indigestion**.

Demulcent herbs can help ease **heartburn**, another bothersome digestive condition. These herbs are rich in mucilage, soothing irritated or inflamed

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tissue. Examples of demulcent herbs are **marsh mallow** root (*Althaea officinalis*), Irish moss (*Chondrus crispus*), and **slippery elm** (*Ulmus rubra*).

Herbs, known as **bitters**, can relieve **constipation** and assist the stomach in acid digestion. Bitter herbs stimulate bile production, and bile is the body's natural laxative. Taking bitters in a capsule or pill form will not work because in order for the liver to produce bile, the bitters must be tasted, not just ingested. Some examples of a bitter herb are **dandelion** root (*Taraxacum officinale*), ginger, and **aloe** (*Aloe vera*).

Ginger has been found to be particularly useful in treating nausea. Ginger has stimulating and antiemetic properties that warm the stomach to reduce intestinal and gas pain.

Aloe can be a powerful laxative when used internally. It takes 10 to 15 hours to work in the body, so it is best used in the evening before bedtime. People should not use aloe for an extended period of time, or dependency can develop. Overuse of aloe can result in loss of intestinal tone. Overdoses of aloe can result in diarrhea, intestinal distress, and kidney problems, so caution should be taken when using this herb.

Papain, also known as papaya extract, aids with the digestion of protein. It has also been used to treat **burns** and to help treat cancer.

Astringent herbs are beneficial in slowing down diarrhea. These herbs contain tannin, a substance that causes protein in body tissues to tighten up. When an astringent herb is taken, the proteins in the digestive tract tighten up to form a protective barrier that reduces fluid and electrolyte loss.

Many of these herbs make delicious teas and are commonly available as packaged teas. Those who wish to make their own tea should try steeping one teaspoon of dry herb per cup of boiled water for five to 10 minutes. They should be sure to cover the tea so that the volatile oils do not evaporate. An Indian custom that is also helpful for digestion is to keep fennel or anise seed available at the table to pass around following a meal.

Precautions

A few suggestions apply before using any of the various herbal supplements to aid digestion. It is best not to overeat, and snacking between meals on anything other than fruit should be avoided. Individuals should increase their consumption of fruit, vegetables, and whole grains and try to decrease the amount of fatty foods, red meat, dairy products, nuts, and nut butters from the diet. People should try to relax while eating, chew food 10 to 20 times, and avoid distractions while eating, such as reading or watching television. They should also drink at least eight glasses of water each day. Care should be taken not to exceed the recommended dosage as indicated on the product label.

There have been very few scientific studies to prove either the adverse or the beneficial health effects of the 1,500-plus herbal products that are available throughout the United States. Furthermore, under the Dietary Supplement Health and Education Act of 1994, herbal products are not required to be proven safe before they are marketed. After the product is marketed, the U.S. Food and Drug Administration (FDA) must prove the dietary supplement unsafe before it can be removed from the shelves. Many people associate the term natural with safe, and that is not always the case. Anyone taking herbal products of any kind should be certain to read labels carefully and discuss the products with a physician to evaluate potential interactions with other medical conditions and/or prescription medications. As is the case with some prescription medications, dependency on some herbal supplements is possible.

Herbal preparations can vary widely from one brand to another and within the same brand from one purchase to the next, making inconsistency in the concentration of ingredients a potential risk. Anyone using herbal products should be careful and try to use well-known brands, because these products are largely unregulated.

Side effects and interactions

Side effects such as breathing problems or tightness in the throat or chest, chest pain, skin **hives**, rash, or itchy or swollen skin may be the signs of an allergic reaction. The product should be discontinued and the patient should seek the advice of a physician.

Persons wishing to take digestive enzymes should consult a physician. Herbs have the potential to interact with any prescription medication, as well as with other herbs. Patients taking the prescription medications acarbose (Precose), anisindione (Miradon), or miglitol (Glyset) should consult their physician before using pancreatin. The use of digestive enzymes has not been extensively studied in pregnant women, so the use of these supplements during **pregnancy** is not recommended. Patients taking the anticoagulant warfarin (Coumadin) should consult their doctor before using papain digestive enzymes.

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KEY TERMS

Cellulose—A material derived from the cell walls of certain plants. It is used in the production of many vegetable fibers and is a major raw material component in the production of manufactured fibers including acetate, rayon, and triacetate.

Digestion—The body's process of breaking down food, extracting energy and nutrients, and eliminating unusable components.

Microflora—Beneficial bacteria in the intestines that produce enzymes to aid digestion.

Peristalsis—The wave-like action that pushes food through the digestive tract.

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ORGANIZATIONS

Alternative Medicine Foundation, PO Box 60016, Potomac, MD, 20859, (301) 340-1960, http://www.amfoundation.org.

Digestive Disease National Coalition, 507 Capitol Court NE, Suite 200, Washington, DC, 20002, (202) 544-7497, http://www.ddnc.org.

Gastro-Intestinal Research Foundation, 70 East Lake Street, Suite 1015, Chicago, IL, 60601 5907, (312) 332-1350, http://www.girf.org.

National Center for Complementary and Alternative Medicine. National Institutes of Health, 9000 Rockville Pike, Bethesda, MD, 20892, (888) 644-6226, http://www.nccam.nih.gov.

National Digestive Diseases Information Clearinghouse, 2 Information Way, Bethesda, MD, 20892-3570, (800) 891-5389, http://digestive.niddk.nih.gov.

Office of Dietary Supplements. National Institutes of Health, 6100 Executive Blvd. Room 3B01, MSC 7517, Bethesda, MD, 20892-7517, (301) 435-2920, http://ods.od.nih.gov.

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Digitalis

Definition

Digitalis is the name of a genus of plants in the Plantaginaceae family. The genus, also known as foxgloves, contains about 20–30 species, perhaps the best

Digitalis. (© Michael P. Gadomski/Photo Researchers, Inc. Reproduced by permission.)

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known of which is *Digitalis purpurea*, the common **foxglove**. The plant's common name comes from the fact that its flowers often fit neatly over a human finger, like a tiny glove. The term *digitalis* also refers to a class of cardiac glycosides obtained from the plant. A glycoside is a chemical compound consisting of two parts, one of which is always a sugar. Cardiac glycosides are glycosides that stimulate the heart, and that have important medical applications in coronary diseases and disorders.

Description

Digitalis is usually a biennial, although it may survive as a perennial. In its first year, the plant sends up a rosette of smallish leaves; in its second year, it has long (3–4 feet in length) flowering stems that carry pink, white, purple, or even yellow flowers that are very attractive to bees and other insects. The plant is tolerant of poor soil, although it prefers a loose, well–drained habit. It fluorishes in Europe (where it is especially popular among British gardeners), western and central Asia, and northwestern Africa.

An English physician, William Withering (1741–1799) is usually given credit for having discovered the medical benefits of the digitalis plant. The story is told that one of Withering's patients was cured of a potentially fatal heart condition after taking a secret concoction that he received from a local gypsy. Withering convinced the gypsy to reveal her secret: The concoction consisted of a mixture of herbs, the most important of which was leaves of *D. purpurea*.

The cardiac effects of digitalis had been known long before Withering's time, but within a different context. The plant had frequently been used as a poison. The essential discovery Withering made was that, in addition to being poisonous, digitalis could have beneficial effects if used in less concentrated, smaller amounts. A typical dose of digitalis used for therapeutic treatment is less than 0.5 mg per day. The drug is widely used to treat heart failure and arrhythmias (irregular heartbeat).

Probably the best known and most widely used cardiac glycosides extracted from the digitalis plant are digoxin (Lanoxin®, Stillicor®, Vanoxin®) and digitoxin (Crystodigin®, Unidigin®, Tardigal®), both obtained from *D. purpurea*. A second member of the digitalis genus, *D. lanata* also contains medically useful glycosides, deslanoside (Cedilanid–d®, Deacetyllanatoside C®) and lanatoside C (Isolanide®). Cardiac glycosides are also extracted from a number of non–digitalis plants, including:

- Adonitoxin, from *Adonis vernalis*, false hellebore
- Convallatoxin, from *Convallaria majalis*, lily of the valley
- Neriantin, from *Nerium oleander*, common oleander
- Proscillaridin, from *Scilla maritima*, squill
- Sarveroside, from *Strophanthus sarmentosus*

Mechanism of action

The cardiac effects produced by digoxin, digitoxin, and other cardiac glycosides are the result of their inhibitory action on a critical enzyme in the central nervous system, Na^+/K^+–ATPase (the so–called "sodium–potassium pump"). This enzyme facilitates the flow of **sodium** ions (Na^+) and **potassium** ions (K^+) across cell membranes, maintaining the proper electrical potential in cells. The flow of sodium ions is also associated with the flow of **calcium** ions into and out of heart muscle cells by a mechanism that is not yet completely understood by scientists. Since calcium ions are needed for the contraction of heart muscle, any change in their concentration affects and may inhibit normal heart rhythms. Such inhibition may have beneficial effects, as in controlling arrhythmias or harmful effects, as in stopping heart contractions entirely, resulting in heart failure and death.

Uses

In allopathic medicine, digoxin, digitoxin, and other cardiac glycosides have relatively limited and specific applications in the treatment of coronary disorders, primarily arrhythmias and heart failure. Alternative healers have not suggested other uses beyond these applications. Some early studies suggest that cardiac glycosides may have some benefit in the treatment of **cancer**, although much more research is needed to confirm this hypothesis.

Side effects

The most serious side effect of the cardiac glycosides is the induction of cardiac arrhythmia, which, in turn, leads to death. The use of digitalis drugs is contraindicated with individuals who are hypokalemic (deficient in potassium), who have an atrioventricular block (a dysfunctional electrical function of cardiac muscle), or who have Wolff–Parkinson–White (WPW) syndrome (a condition caused by abnormal electrical function in the heart). Individuals with abnormal or deficient renal function are also not candidates for digitalis therapy since the drug is not excreted normally by such individuals and serum levels of the drug may accumulate to hazardous or toxic levels.

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KEY TERMS

Arrhythmia—An irregular heartbeat.

Atrioventricular block—A dysfunctional electrical function of cardiac muscle.

Cardiac glycoside—A chemical compound, often derived from a plant, consisting of a sugar joined to another chemical group, with biological effects on the heart.

Hypokalemia—A deficiency of potassium in the bloodstream.

Sodium–potassium pump—A system responsible for the diffusion of sodium ions and potassium ions across cell membranes.

Wolff–Parkinson–White (WPW) syndrome—A condition caused by abnormal electrical function in the heart.

Interactions

Digitalis interacts with a number of commonly used allopathic medications, including non–steroidal anti–inflammatory drugs (NSAIDs), calcium–channel blockers, beta–blockers, and the antiarrhythmic medication quinidine. All of these drugs operate directly on the cardiac system and, thus, amplify the effects of cardiac glycosides. Other drugs interact with digitalis indirectly. Diuretics, for example, tend to reduce the concentration of potassium in the blood, disrupting the normal sodium/potassium levels needed for operation of the sodium–potassium pump.

Alternative healers list a number of possible interactions with herbs and other supplements used in their practice, including interactions with:

- Potassium and magnesium supplements
- Buckthorn (*Rhamnus catharticus*)
- Cascara (*Rhamnus purshiani cortex*)
- Hawthorne (*Crataegus oxyacantha/monogyna*)
- Licorice (*Glycyrrhiza glabra*)
- Sarsaparilla (*Smilax spp.*)
- Senna (*Cassia senna/angustifolia*)
- St. John's wort (*Hypericum perforatum*)

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Diverticulitis

Definition

Diverticulitis refers to the development of inflammation and infection in one or more *diverticula*. Diverticula are outpouchings or bulges that occur when the inner lining layer of the large intestine (colon) bulges out (herniates) through the outer muscular layer. The presence of diverticula indicates a condition called diverticulosis.

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Description

Diverticula tend to occur in the last segment of the large intestine, the sigmoid colon. They occur with decreasing frequency toward the beginning of the large intestine. The chance of developing diverticula increases with age, so that by the age of 50, about 20 to 50% of all people have some diverticula. By the age of 90, virtually everyone has developed some diverticula. Most diverticula measure 3 to 30 mm in diameter. Larger diverticula, termed giant diverticula, are quite infrequent but may measure as large as 15 cm in diameter.

The great majority of people with diverticulosis remain symptom-free. Many diverticula are quite accidentally discovered during examinations for other conditions of the intestinal tract.

Causes and symptoms

Diverticula are believed to be caused by overly forceful contractions of the muscular wall of the large intestine. As areas of this wall spasm, they become weaker and weaker, allowing the inner lining to bulge through. The anatomically weakest areas of the intestinal wall occur next to the blood vessels that course through the wall, so diverticula commonly occur in these locations.

Diverticula are most common among the populations of the developed countries of the West (North America, Great Britain, and northern and western Europe). Experts believe that this pattern is due to **diets** in these countries, which tend to be quite low in fiber. A diet low in fiber results in the production of smaller volumes of stool. In order to move this smaller stool along the colon and out of the rectum, the colon must narrow itself significantly and does so by contracting down forcefully. This causes an increase in pressure, which, over time, weakens the muscular wall of the intestine and allows diverticular pockets to develop.

Diverticulitis is believed to occur when a hardened piece of stool, undigested food, and bacteria (called a fecalith) becomes lodged in a diverticulum. This blockage interferes with the blood supply to the area, and infection sets in.

Diverticulitis is three times more likely to occur in the left side of the large intestine. Since most diverticula are located in the sigmoid colon (the final segment of the large intestine that empties into the rectum), most diverticulitis also takes place in the sigmoid. The elderly have the most serious complications from diverticulitis, although very severe **infections** can also occur in patients under the age of 50. Men are three times more likely than women to be stricken with diverticulitis.

An individual with diverticulitis experiences **pain** (especially in the lower left side of the abdomen) and **fever**. In response to the infection and the irritation of nearby tissues within the abdomen, the abdominal muscles may begin to spasm. About 25% of all patients with diverticulitis have some rectal bleeding, although this condition rarely becomes severe. Walled-off pockets of infection, called abscesses, may appear within the wall of the intestine or even on the exterior surface of the intestine. When a diverticulum weakens sufficiently and is filled to bulging with infected pus, a perforation in the intestinal wall may develop. When the infected contents of the intestine spill into the abdomen, a severe infection called peritonitis occurs. Peritonitis is an infection and inflammation of the lining of the abdominal cavity, the peritoneum. Other complications of diverticulitis include the formation of abnormal connections, called fistulas, between two organs that normally do not connect (for example, the intestine and the bladder), and scarring outside the intestine that squeezes off and obstructs a portion of the intestine.

Diagnosis

When diverticula are suspected because a patient begins to have sudden rectal bleeding, the location of the bleeding can be studied by performing angiography. Angiography involves the insertion of a tiny tube (catheter) through an artery in the leg and moving it up into one of the major arteries of the gastrointestinal system. A dye (contrast medium) that will show up on x-ray films is injected into the catheter, and the area of bleeding is located by looking for an area where the contrast is leaking into the interior (lumen) of the intestine.

A procedure called colonoscopy provides another method for examining the colon and locating the site of bleeding. In colonoscopy, a small, flexible scope (colonoscope) is inserted through the rectum and into the intestine. A fiber-optic camera that projects to a nearby television screen is mounted in the colonoscope, which allows the physician to view the interior of the colon and locate the source of bleeding.

Diagnosis of diverticulitis is not difficult in patients with previously diagnosed diverticulosis. The presence of abdominal pain and fever in such an individual would make the suspicion of diverticulitis quite high. Examination of the abdomen usually reveals tenderness to touch, with the patient's abdominal muscles contracting strongly to protect the tender

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area. During a rectal exam, a doctor may be able to feel an abnormal mass. Touching this mass may prove painful to the patient.

When doctors suspect diverticulitis as the cause for the patient's symptoms, they most likely avoid the types of tests usually used to diagnose gastrointestinal disorders. These tests include barium enema and colonoscopy (although colonoscopy may have been used earlier to diagnose the diverticulosis). The concern is that the increased pressure exerted on the intestine during these exams may increase the likelihood of intestinal perforation. After medical treatment for the diverticulitis, these examinations may be performed in order to learn the extent of the patient's disease.

Treatment

Treatment for uncomplicated diverticulitis usually requires hospitalization, but some physicians try treatment at home for very mildly ill patients. These patients are put on a liquid diet and receive oral antibiotics. Although **relaxation**, **guided imagery**, and **acupuncture** treatment may be helpful in alleviating pain symptoms, a course of antibiotics is necessary to treat the infection itself.

An infusion of herbs with anti-inflammatory and soothing properties, such as **Mexican yam** (*Dioscorea villosa*), German **chamomile** (*Matricaria recutita*), **marsh mallow** (*Althaea officinalis*), and calamus (*Acorus calamus*, or sweet flag) may be helpful in treating the inflammation of diverticulitis. **Ginger** (*Zingiber officinale*) can also be helpful in relieving gastrointestinal **gas** that may be symptomatic of the disorder.

Allopathic treatment

Resting the bowel is a mainstay of treatment and involves keeping the patient from eating or sometimes even drinking anything by mouth. Therefore, a patient hospitalized for diverticulitis receives fluids through a needle in the vein (intravenous or IV fluids). Antibiotics are also administered through the IV. In cases of severe bleeding (hemorrhaging), blood transfusion may be necessary. Medications that encourage clotting may also be required.

While there are almost no situations in which uncomplicated diverticulosis requires surgery, giant diverticula always require removal. This procedure is necessary because of the very high chance of infection and perforation of these diverticula. When giant diverticula are diagnosed, the usual treatment involves removing that portion of the intestine in which they are located.

The various complications of diverticulitis need to be treated aggressively because the death rate from problems such as perforation and peritonitis is quite high. Abscesses can be drained of their infected contents by inserting a needle through the skin of the abdomen and into the **abscess**. When this procedure is unsuccessful, open abdominal surgery is required to remove the piece of the intestine containing the abscess. Fistulas require surgical repair, including the removal of the length of intestine containing the origin of the fistula, followed by immediate reconnection of the two free ends of intestine. Peritonitis requires open surgery. The entire abdominal cavity is cleaned by being irrigated (washed) with a warmed sterile salt-water solution, and the damaged piece of intestine is removed. Obstructions require immediate surgery to prevent perforation. Massive, uncontrollable bleeding, while rare, may require removal of part or all of the large intestine.

During any of these types of operations, the surgeon must make an important decision regarding the quantity of intestine that must be removed. When the amount of intestine removed is great, it may be necessary to perform a colostomy. A colostomy involves pulling the end of the remaining intestine through the abdominal wall to the outside. This bit of intestine is then fashioned so that a bag can be fit over it. The patient's waste (feces) collects in the bag because the intestine no longer connects with the rectum. This colostomy may be temporary, in which case another operation is required to reconnect the intestine, after some months of substantial healing has occurred. Other times, the colostomy needs to be permanent, and the patient has to adjust to living permanently with the colostomy bag. Most people with colostomies are able to have active lives.

Occasionally, a patient has such severe diverticular disease that a surgeon recommends planning ahead and schedules removal of a portion of the colon. This procedure is done to avoid the high risk of surgery performed after a complication has set in. Certain developments identify those patients who are at very high risk of experiencing dangerous complications, such as those with a history of diverticulitis.

Surgery for chronic (recurring) diverticulitis remains controversial. Some surgeons say that surgery prevents recurrence of problems, while others say it does not. The guidelines of the Society for Surgery of the Alimentary Canal (2007) suggest that "elective sigmoid resection may not be necessary after any specific number of episodes of uncomplicated diverticulitis, or with any definite age thresholds."

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KEY TERMS

Angiography—X-ray imaging of the arteries in a particular part of the body. Angiography is often performed in order to determine the location of internal bleeding.

Bowel obstruction—A blockage in the intestine that prevents the normal flow of waste down the length of the intestine.

Colonoscopy—Examination of an area of the gastrointestinal tract by putting a lighted scope, usually bearing a fiber-optic camera, into the rectum and passing it through the intestine.

Colostomy—A procedure performed when a large quantity of intestine is removed. The end piece of the intestine leading to the rectum is closed.

Fistula—An abnormal connection formed between two organs which usually have no connection at all.

Sigmoid colon—The final portion of the large intestine which empties into the rectum.

Expected results

The prognosis for people with diverticula is excellent, with only 20% of such patients ever seeking any medical help for their condition.

While diverticulitis can be a difficult and painful disease, it is usually quite treatable. Prognosis is worse for individuals who have other medical problems, particularly those requiring the use of steroid medications, which increase the chances of developing a serious infection. Prognosis is also worse in the elderly.

Prevention

While there is no certain way to prevent the development of diverticula, experts believe that high-fiber diets may help. Foods that are recommended for their high fiber content include whole grain breads and cereals and all types of fruits and vegetables. Most experts suggest that individuals take in 20 to 35 grams of fiber daily. If this is not possible to achieve through diet, an individual may supplement with fiber products that are mixed into juice or water.

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ORGANIZATIONS

National Digestive Diseases Information Clearinghouse, 2 Information Way, Bethesda, MD, 20892-3570, (301)654-3810, http://www.niddk.nih.gov/health/digest/nddic.htm.

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Diverticulosis *see* **Diverticulitis**

Dizziness

Definition

Dizziness is classified into three categories—vertigo, syncope, and nonsyncope nonvertigo. Each category has a characteristic set of symptoms, all related to the sense of balance. In general, syncope is defined by a brief loss of consciousness (fainting) or by dimmed vision and feeling uncoordinated, confused, and lightheaded. Many people experience a sensation like syncope when they stand up too fast. Vertigo is the feeling that either the individual or the surroundings are spinning. This sensation is like being on a spinning amusement park ride. Individuals with nonsyncope nonvertigo dizziness feel as though they cannot keep their balance. This sensation may become worse with movement.

Description

The brain coordinates information from the eyes, the inner ear, and the body's senses to maintain balance. If any of these sources of information is disrupted,

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the brain may not be able to compensate. For example, people sometimes experience **motion sickness** because the information from their body tells the brain that they are sitting still, but information from the eyes indicates that they are moving. The messages do not correspond and dizziness results.

Vision and the body's senses are the most important systems for maintaining balance, but problems in the inner ear are the most frequent cause of dizziness. The inner ear, also called the vestibular system, contains fluid that helps to fine tune the information the brain receives from the eyes and the body. When fluid volume or pressure in the inner ear changes, information about balance is altered. The discrepancy gives conflicting messages to the brain about balance and induces dizziness.

Certain medical conditions can cause dizziness because they affect the systems that maintain balance. For example, the inner ear is very sensitive to changes in blood flow. Because such medical conditions as high blood pressure or low blood sugar can affect blood flow, these conditions are frequently accompanied by dizziness. Circulation disorders are the most common causes of dizziness. Other causes are head injuries, ear **infections**, **allergies**, and nervous system disorders.

Dizziness often disappears without treatment or with treatment of the underlying problem, but it can be long-term or chronic. According to the National Institutes of Health, 42% of Americans will seek medical help for dizziness at some point in their lives. The costs may exceed a billion dollars and account for five million visits to physicians annually. Episodes of dizziness increase with age. Among people aged 75 or older, dizziness is the most frequent reason for seeing a doctor.

KEY TERMS

Acoustic neuroma—A benign tumor that grows on the nerve leading from the inner ear to the brain. As the tumor grows, it exerts pressure on the inner ear and causes severe vertigo.

Autonomic nervous system—The part of the nervous system that controls such involuntary body functions as breathing and heart beat.

Electronystagmography—A method for measuring the electricity generated by eye movements. Electrodes are placed on the skin around the eye and the individual is subjected to a variety of stimuli so that the quality of eye movements can be assessed.

Ménière's disease—A disease of the labyrinth in the ear, characterized by dizziness, hearing loss, ringing in the ears, and nausea.

Syncope—Dizziness or brief loss of consciousness resulting from an inadequate flow of oxygenated blood to the brain.

Vertigo—Dizziness associated with a sensation of whirling or spinning.

Vestibular system—The area of the inner ear that helps maintain balance.

Causes and symptoms

Careful attention to symptoms can help determine the underlying cause of the dizziness. The underlying problems may be benign and easily treated, or they may be dangerous and require intensive therapy. Not all cases of dizziness can be linked to a specific cause. More than one type of dizziness can be experienced at the same time and symptoms may be mixed. Episodes of dizziness may last for a few seconds or for days. The length of an episode is related to the underlying cause.

The symptoms of syncope include dimmed vision, loss of coordination, confusion, lightheadedness, and sweating. These symptoms can lead to a brief loss of consciousness or fainting. They are related to a reduced flow of blood to the brain; they often occur when a person is standing up and can be relieved by sitting or lying down. Vertigo is characterized by a sensation of spinning or turning, accompanied by **nausea**, **vomiting**, ringing in the ears, **headache**, or **fatigue**. An individual may have trouble walking, remaining coordinated, or keeping balance. Nonsyncope nonvertigo dizziness is characterized by a feeling of being off balance that becomes worse if the individual tries moving or performing detail-intense tasks.

A person may experience dizziness for many reasons. Syncope is associated with low blood pressure, heart problems, and disorders in the autonomic nervous system, which controls such involuntary functions as breathing. Syncope may also arise from emotional distress, **pain**, and other reactions to outside stressors. Nonsyncope nonvertigo dizziness may be caused by rapid breathing, low blood sugar, or **migraine headache**, as well as by more serious medical conditions.

Vertigo is often associated with inner ear problems called vestibular disorders. A particularly intense vestibular disorder, **Ménière's disease**, interferes with the volume of fluid in the inner ear. This disease, which affects approximately one in every 1,000 people, causes intermittent vertigo over the course of weeks, months, or years. Ménière's disease is often accompanied by

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ringing or buzzing in the ear, **hearing loss**, and a feeling that the ear is blocked. Damage to the nerve that leads from the ear to the brain can also cause vertigo. Such damage can result from head injury or a tumor. An acoustic neuroma, for example, is a benign tumor that wraps around the nerve. Vertigo can also be caused by disorders of the central nervous system and circulation, such as hardening of the arteries (arteriosclerosis), **stroke**, or **multiple sclerosis**.

Some medications cause changes in blood pressure or blood flow. These medications can cause dizziness in some people. Prescription medications carry warnings of such side effects, but common drugs such as **caffeine** or nicotine can also cause dizziness. Certain antibiotics can damage the inner ear and cause hearing loss and dizziness.

Diet may cause dizziness. The role of diet may be direct, as through alcohol intake. It may also be indirect, as through arteriosclerosis caused by a high-fat diet. Some people experience a slight dip in blood sugar and mild dizziness if they miss a meal, but this condition is rarely dangerous unless the person is diabetic. Food sensitivities or allergies can also be a cause of dizziness. Such chronic conditions as **heart disease** and serious acute problems such as seizures and strokes can cause dizziness. These conditions, however, usually exhibit other characteristic symptoms.

Diagnosis

During the initial medical examination, an individual with dizziness should provide a detailed description of the type of dizziness experienced, when it occurs, and how often each episode lasts. A diary of symptoms may help to track this information. The patient should report any symptoms that accompany the dizziness, such as ringing in the ear or nausea, any recent injury or infection, and any medication taken.

The examiner will check the patient's blood pressure, pulse, respiration, and body temperature as well as the ear, nose, and throat. The sense of balance is assessed by moving the individual's head to various positions or by tilt-table testing. In tilt-table testing, the person lies on a table that can be shifted into different positions and reports any dizziness that occurs.

Further tests may be indicated by the initial examination. Hearing tests help assess ear damage. X rays, computed tomography scan (CT scan), and magnetic resonance imaging (MRI) can pinpoint evidence of nerve damage, tumors, or other structural problems. If a vestibular disorder is suspected, a technique called electronystagmography (ENG) may be used. ENG measures the electrical impulses generated by eye movements. Blood tests can determine diabetes, high **cholesterol**, and other diseases. In some cases, a heart evaluation may be useful. Despite thorough testing, however, an underlying cause cannot always be determined.

Doctors caution that childhood syncope (fainting), although rarely serious, can indicate a serious cardiac condition. If the fainting is abrupt or happens with exertion, it may indicate a more serious problem.

Treatment

Because dizziness may arise from serious conditions, it is advisable to seek medical treatment. Alternative treatments can often be used alongside conventional medicine without conflict. Potentially beneficial therapies include nutritional therapy, herbal remedies, **homeopathy**, **aromatherapy**, **osteopathy**, **acupuncture**, **acupressure**, and **relaxation** techniques.

Nutritional therapy

To prevent dizziness, nutritionists often advise eating smaller but more frequent meals and avoiding caffeine, nicotine, alcohol, foods high in fat or sugar, or any substances that cause allergic reactions. A low-salt diet may also be helpful to some people. Nutritionists may also recommend certain dietary supplements:

- Magnesium citrate, aspartate or maleate: for dizziness caused by magnesium deficiency.
- B-complex vitamins, especially vitamin B_{12}: for dizziness caused by deficiency of these essential vitamins.

Herbal remedies

The following herbs have been used to treat dizziness symptoms:

- Ginger: for treatment of dizziness caused by nausea.
- *Ginkgo biloba*: may decrease dizziness by increasing blood flow to the brain.

Homeopathy

Homeopathic therapies can work very effectively for dizziness, and are especially applicable when no organic cause can be identified. They are chosen according to the patient's specific symptom profile:

- Aconite: for feeling light-headed from postural hypotension (getting up too quickly).
- Coccolus: for motion sickness or syncope.
- Conium maculatum: for feeling dizzy while looking at rapidly-moving images.

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- Gelsemium: for feeling light-headed and out of balance, often associated with influenza or stage fright.
- Petroleum: for dizziness upon standing up too fast and headache before and after a storm.

Aromatherapy

Aromatherapists recommend a warm bath scented with **essential oils** of **lavender**, geranium, and sandalwood as treatment for dizziness. This therapy can have a calming effect on the nervous system.

Osteopathy

An osteopath or chiropractor may suggest manipulations or adjustments of the head, jaw, neck, and lower back to relieve pressure on the inner ear.

Acupressure

Acupressure may be able to improve circulation and decrease the symptoms of vertigo. The Neck Release, which involves pressing on five pairs of points on the shoulder blades and neck, is helpful for dizziness associated with migraine headaches.

Relaxation techniques

Relaxation techniques, such as **yoga**, **meditation**, and **massage therapy** for relieving tension, are popularly recommended methods for reducing **stress**.

Allopathic treatment

Treatment of dizziness is determined by the underlying cause. If an individual has a cold or **influenza**, a few days of bed rest is usually adequate to resolve dizziness. Other causes of dizziness, such as mild vestibular system damage, may resolve without medical treatment. If dizziness continues, drug therapy may be required to treat such underlying illnesses as high blood pressure, arteriosclerosis, nervous conditions or diabetes. A physician may also prescribe antibiotics if ear infections are suspected. Selective serotonin reuptake inhibitors (SSRIs) have recently been shown to relieve dizziness in patients who have psychiatric symptoms. When other measures have failed, surgery may be suggested to relieve pressure on the inner ear. If the dizziness is not treatable by drugs, surgery, or other means, physical therapy may be used and the patient may be taught coping mechanisms for the problem.

Expected results

The outcome of treatment depends on the cause of dizziness. Controlling or curing the underlying factors usually relieves the dizziness itself. In some cases, the symptoms disappear without treatment. In a few cases, dizziness can become a permanent disabling condition.

Prevention

Most people learn through experience that certain activities will make them dizzy and they learn to avoid them. For example, if reading in a car produces motion sickness, reading should be postponed until after the trip. Changes in diet can also cut down on episodes of dizziness in susceptible people. For example, persons with Ménière's disease may avoid episodes of vertigo by leaving salt, alcohol, and caffeine out of their **diets**. Reducing blood cholesterol can help diminish arteriosclerosis and indirectly treat dizziness. Daily multiple vitamin and mineral supplements may help prevent dizziness caused by deficiencies of these essential nutrients. Relaxation techniques can help ward off tension and **anxiety** that can cause dizziness.

Some cases of dizziness cannot be prevented. Acoustic neuromas, for example, are not predictable or preventable. Alternative approaches designed to rebalance the body's energy flow, such as acupuncture and constitutional homeopathy, may be helpful in cases where the cause of dizziness cannot be pinpointed.

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"SSRIs Relieve Dizziness in Psyciatric Patients." *Critical Care Alert* (August 2002): 2.

ORGANIZATIONS

Ménière's Network. 2000 Church St., P.O. Box 111, Nashville, TN 37236. (800) 545-4327.

The Vestibular Disorders Association. P.O. Box 4467, Portland, OR 97208-4467. (503) 229-7705. http://www.teleport.com/~veda/.

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Dolomite

Description

Physical characteristics

Dolomite is a common mineral. Chemically, dolomite is **calciummagnesium** carbonate $CaMg(CO_3)_2$, a type of compact limestone. In combination with calcite and aragonite, dolomite makes up approximately 2% of the earth's crust. The mineral was first described by and then named after the French mineralogist and geologist Deodat de Dolomieu (1750–1801).

Dolomite is a fairly soft mineral that occurs as crystals as well as in large sedimentary rock beds several hundred feet thick. The crystals—usually rhombohedral in shape—are transparent to translucent and are colorless, white, reddish-white, brownish-white, gray, or sometimes pink. In powdered form, dolomite dissolves readily with effervescence in warm acids.

Although rock beds containing dolomite are found throughout the world, the most notable quarries are located in the Midwestern United States; Ontario, Canada; Switzerland; Pamplona, Spain; and Mexico.

Formation

Although dolomite does not form on the surface of the earth at the present time, massive layers of dolomite can be found in ancient rocks. Dolomite is one of the few sedimentary rocks that undergoes a significant mineralogical change after it is deposited. Dolomite rocks are originally deposited as calcite/aragonite–rich limestone, but during a process called diagenesis, the calcite and/or aragonite is transformed into dolomite. Magnesium-rich ground water containing a significant amount of salt is thought to be essential to dolomite formation. Thus, warm, tropical marine environments are considered the best sources of dolomite formation.

Close-up view of the mineral dolomite. In combination with calcite and aragonite, dolomite makes up approximately two percent of the earth's crust. *(GC Minerals / Alamy)*

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Chemical components

Dolomite is composed of 52.06% oxygen, 13.03% carbon, 13.18% magnesium, and 21.73% calcium. **Iron** and **manganese** carbonates, barium, and lead are sometimes present as impurities.

General use

Dolomite is commonly used in a variety of products. A few of these are listed below:

- antacids (neutralizes stomach acid)
- base for face creams, baby powders, or toothpaste
- calcium/magnesium nutritional supplements for animals and humans
- ceramic glazes on china and other dinnerware (dolomite is used as source of magnesia and calcia)
- fertilizers (dolomite added as soil nutrient)
- glass (used for high refractive optical glass)
- gypsum impressions from which dental plates are made (magnesium carbonate)
- mortar and cement
- plastics, rubbers, and adhesives

Although calcium carbonate (as found in dolomite) has a high percentage of calcium by weight (40%) and is the most common preparation available, this form of calcium is relatively insoluble and can be difficult to break down in the body. In contrast, calcium citrate, although containing about half as much calcium by weight (21%), is a more soluble form. Since calcium citrate does not require gastric acid for absorption, it is considered a better source of supplemental calcium, particularly for the elderly, whose stomach acid secretions are decreased.

Calcium supplements offer many benefits and research indicates that calcium supplements can help prevent formation of **kidney stones** when combined with a fairly low animal protein-low salt diet. Doctors once advised a low-calcium diet to prevent kidney stones.

Preparations

Dolomite is generally ground into coarse or finely grained powder and made into calcium/magnesium capsules or antacids for human consumption. The powdered form is also used in animal feed, fertilizers, and a variety of other applications.

Precautions

Nutritional supplements

Concern about heavy-metal contamination of calcium supplements first arose in the early 1980s. Natural sources of dolomite sometimes contain small amounts of lead and other heavy metals that remain after being processed for human use. As late as 2005, *Consumer Reports* magazine reported that some calcium supplements still contain very small amounts of lead. Most experts believe that such supplements are generally safe and their benefits far outweigh the small risks they pose to human health.

When purchasing calcium supplements, products marked as purified (especially those made from dolomite, bone meal, or oyster shells) or those containing the USP (*United States Pharmacopoeia*) symbol are considered the safest. The symbol means that the vitamin and mineral manufacturer's product has voluntarily met the USP criteria for quality, strength, and purity.

Research also encourages consumers to tell their doctors when they take antacids and calcium supplements so that physicians can watch for possible side effects or interactions with medications. Some antacids can cause side effects that eventually put patients at risk for serious problems. If patients have a complicating problem such as renal dysfunction, they can suffer from aluminum toxicity from certain antacids.

Ceramic glazes

Another potential health risk associated with dolomite arises from storing food in or eating or drinking from dinnerware or cups made with glazes containing dolomite. Although it is not possible to detect a lead glaze on china with the naked eye, corroded glaze, or a dusty or chalky, gray residue on the glaze after the piece has been washed is a good indication of lead content. Although high lead toxicity is rare, trace amounts may be present. If possible, it is best to purchase dinnerware that is labeled lead-free. Also, stoneware, unless painted with decorations on the surface, are normally coated with a material that contains no lead. Glass dishes, with the exception of leaded glass and glass painted with decorations or decals, are also considered safe.

The problem is intensified if the food or beverage consumed is acidic, since acid increases lead leaching. Although other additives in glazes may contribute to the lead content (such as lead oxide

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or cadmium) leaching out, dolomite is a potential cause for lead toxicity.

Glazes on bathtubs also may contain harmful amounts of lead, which may leach out into the bathwater, especially if the glaze is worn. Information regarding lead content can be obtained from the manufacturer. Lead testing kits are also available by mail order or at most home and garden centers.

Fertilizers and animal feed

Dolomite and bone meal in fertilizers and animal feed may contaminate the soil, animals, and humans with lead and other toxic metals.

Side effects

Indirect side effects may occur if more than the recommended dosage of any calcium supplement is taken over an extended period of time. If an individual consumes more than 2,000 mg/day of calcium, gastrointestinal problems can occur.

Some of the short-term symptoms of low-level lead exposure (which is particularly harmful to the young and elderly) are:

- decreased appetite
- stomachache
- sleeplessness
- constipation
- vomiting
- diarrhea
- fatigue
- irritability
- headaches

Some of the long-term effects of low-level lead exposure are:

- learning disabilities
- brain damage
- loss of IQ points
- attention deficit disorder
- hyperactive behavior
- criminal or antisocial behavior
- neurological problems

Interactions

Research on the interactions of dolomite with other drugs, vitamins, minerals, or foods as of 2008 was limited.

KEY TERMS

Calcium citrate—A chemical compound made from calcium and citric acid.

Diagenesis—Changes that occur in sediment or a sedimentary rock after deposition.

Rhombohedral—A parallelepiped whose edges are all of equal length.

Sedimentary—Formed by deposits of sediment, or material that settles on the bottom in a body of water.

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National Osteoporosis Foundation, 1232 Twenty-Second St.NW, Washington, DC, 20037-1292, (202) 223-2226 http://www.nof.org.

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Dong quai

Description

Dong quai, *Angelica sinensis*, also called Chinese **angelica**, is a member of the Umbelliferae (Apiaceae), or carrot family. This Oriental medicinal herb is sometimes called the empress of herbs, or female ginseng.

Dong quai grows best in such damp places as moist meadows, river banks, and mountain ravines. It may be biennial or perennial. The bitter-sweet root,

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described by some herbalists as resembling carved ivory, is used medicinally. Dong quai, variously known as dang gui or tang kuei, produces a round, hollow, grooved stem that grows as high as 7 ft. The lower leaves are large and tri-pinnate, each further divided into two or three leaflets. The smaller upper leaves are pinnate, which means that the leaflets are arranged in opposite rows along the leaf stalk. The leaves of dong quai resemble those of carrot, celery, or **parsley** and emerge from dilated sheaths surrounding a bluish-colored stem that is branched at the top. Honey-scented, greenish-white flowers grow in large compound flat-topped clusters and bloom from May to August.

General use

Dong quai is one of the most extensively researched Chinese medicinal herbs. It is well known as a female remedy thought to benefit women throughout the menstrual cycle and during the transition to **menopause**. A recent study indicates that dong quai is a popular herbal remedy among women being treated for **ovarian cancer**. Dong quai has been used in China for thousands of years to treat ailments of the female reproductive system and as a tonic herb to treat **fatigue**, mild **anemia**, high blood pressure and poor circulation in both men and women. Chinese herbalists prepare dong quai in combination with other herbs, including **astragalus** (*Astragalus membranaceus*) as a fatigue tonic, **mugwort** (*Artemesia vulgaris*), bai shao (white peony), chai hu (bupleurum root), and rou gui (**cinnamon bark**) in medicinal formulas for women. Secondary herbs are used to enhance the action of the primary ingredient or to provide additional properties that work synergistically with the primary ingredient. Research in the United States indicates that dong quai has no demonstrable estrogen-like effect on menopausal women when it is used alone. However, other research has shown that dong quai, when used in combination with other herbs, resulted in a reduction of the severity of **hot flashes**, vaginal dryness, **insomnia**, and mood changes. Dong quai should not be regarded as a replacement for natural estrogen. Its unique mechanism of action reportedly promotes the synthesis of natural progesterone, a hormone whose production declines during menopause. Dong quai's ability to relieve menstrual problems has been attributed to its muscle-relaxing properties and its ability to quiet spasms in the internal organs. Dong quai has a tonic effect on all female reproductive organs and increases blood flow to the uterus. It acts to increase vaginal secretions and to nourish vaginal tissue. Dong quai root's analgesic properties help diminish uterine **pain** and have been found to be as much as 1.7 times as effective as aspirin. The herb has also been useful in the treatment of migraine headaches.

KEY TERMS

Decoction—A medication or herbal preparation made by boiling.

Infusion—A medicine or herbal preparation made by steeping plant parts or other substances in water to extract their medicinal principles.

Volatile—Evaporating readily at room temperature. The essential oils of a plant are sometimes called volatile oils for this reason.

One recent Western study has called into question the value of dong quai for treating menopausal symptoms. The authors of the study found that **black cohosh** appears to be a more effective herbal remedy for hot flashes and other symptoms associated with menopause.

Research in China indicates that dong quai stimulates production of the red blood cells that carry oxygen throughout the body. Its sedative properties relieve emotional distress and irritability. It is used to treat mild anemia and as a liver tonic. The herb is beneficial to the endocrine and circulatory systems, promoting healthful blood circulation. Its laxative properties ease **constipation**, particularly in the elderly. This beneficial herb has also been proven effective against certain fungi, such as *Candida albicans*, the primary cause of vaginal **yeast infection**. Dong quai also helps to dissolve **blood clots**.

Dong quai contains high amounts of **vitamin E**, **iron**, cobalt, and other vitamins and minerals important to women, including **niacin**, **magnesium**, **potassium**, and vitamins A, C, and B_{12}. The plant contains numerous phytochemicals, including coumarins, phytosterols, polysaccharides, and flavonoids.

European angelica (*A. archangelica*) stimulates secretion of gastric juices and has been used to treat digestive problems, flatulence, and loss of appetite. The root of European angelica has sometimes been used in cases of prolonged labor or to treat problems with retention of the placenta after **childbirth**.

American angelica (*A. atropurpurea*) has also been used by some herbalists for menstrual complaints, though the Chinese dong quai is most often used in formulas for women.

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Preparations

The medicinal part of the angelica plant is the root. Dong quai root can be prepared as an infusion or decoction, tincture, tablet, or capsule. It is also available dried, either whole, diced, or sliced. The herb is nontoxic, but recent findings suggest caution in using it over an extended period of time. The dried root may be chewed in quarter inch segments two to three times daily, up to 3-4 g grams per day.

Infusion or decoction: Research indicates that extracts of dong quai that retain the volatile constituents act to raise blood pressure and relax uterine muscles. An infusion of the root, steeped in hot water, retains the volatile constituents and is useful to treat **dysmenorrhea** and to quiet uterine spasm. For **amenorrhea**, where stimulation of the uterine muscles is sought, a decoction is indicated. Simmer the root in water to evaporate the volatile constituents. Most Chinese herbalists use dong quai in combination with other herbs depending on the problems being addressed and these are prepared together.

Alcohol tincture: Combine fresh or dry, chopped root with enough alcohol to cover in a glass container. Alcohol should be of good quality. A 50/50 alcohol/water ratio is optimal. If the alcohol is not 100 proof, add pure water to obtain a 50/50 ratio. Brandy, vodka, and gin are often used. Seal the mixture in an air-tight container and set aside in a dark place for about two weeks. Shake daily. Strain through cheesecloth or muslin and store in dark containers for up to two years. Dosage: 10-40 drops of the fresh root tincture one to three times daily.

Precautions

Pregnant or lactating women are advised not to use dong quai. Menstruating women who are experiencing unusually heavy bleeding should discontinue use of dong quai without advice of a qualified herbal practitioner, because in certain preparations the herb may act to increase the blood flow. Consult a qualified herbalist before use if fibroids are present, or when there is unusual breast tenderness.

Dong quai should not be used as a substitute for hormonal replacement therapy, or HRT. Women who are concerned about the possible side effects of HRT should consider fo-ti or such other herbs as **licorice** and **hops**.

Side effects

Dong quai has been considered quite safe; however, it may cause minor gastric upset in sensitive individuals. Stomach upset can be eliminated if dong quai is combined with other herbs in preparation. The herb may also increase sensitivity to the sun and other ultraviolet exposure in fair-skinned individuals.

More seriously, a study published in 2002 reported that dong quai appears to encourage the growth of **breast cancer** cells independent of its estrogenic activity. The researchers recommend cautious use of dong quai until definitive studies can be performed. Interestingly, two teams of researchers in the United States and China respectively reported in 2003 that dong quai appears to suppress the growth of human **prostate cancer** cells.

Interactions

Some herbalists suggest that fruit consumption be decreased when using dong quai.

As of 2003, dong quai has been reported to interact with some prescription medications, particularly anticoagulant and antiplatelet drugs. Dong quai appears to have an additive effect with these medications, increasing bleeding time. In May 2002 the U.S. Food and Drug Administration added dong quai to the list of herbal products not to be used together with sodium warfarin (Coumadin).

Dong quai has also been reported to interact with bleomycin (Blenoxane), an anticancer drug used to treat tumors of the cervix, uterus, testicle, and penis, as well as certain types of lymphoma.

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Dowsing *see* **Radiesthesia**

Drug abuse *see* **Substance abuse and dependence**

Dry mouth

Definition

Dry mouth, known medically as xerostomia, is the abnormal reduction of saliva due to medication, disease, or medical therapy.

KEY TERMS

Salivary duct—Tube through which saliva is carried from the salivary gland to the mouth.

Salivary gland—Gland in which saliva is formed.

Sjögren's syndrome—An autoimmune disorder in which the body's white cells attack the glands that produce saliva and tears. Dry mouth is a core symptom of Sjögren's syndrome.

Xerostomia—The medical term for dry mouth.

Description

Dry mouth due to the lack of saliva can be a serious medical problem. Decreased salivation can make swallowing difficult, decrease taste sensation, and promote tooth decay.

Causes and symptoms

Dry mouth, resulting from thickened or reduced saliva flow, can be caused by a number of factors: medications, both prescription and over-the-counter; systemic diseases, such as **anemia** or diabetes, manifestations of syndromes such as **rheumatoid arthritis**, lupus, chronic hardening and thickening of the skin, or chronic and progressive inflammation of skeletal muscles; **infections** of the salivary glands; blockage of the salivary ducts caused by stones or tumors forming in the ducts through which the saliva passes; dehydration; medical therapies, such as local surgery or radiation; secretion reduction due to the normal **aging** process; and emotional **stress**.

Dry mouth, together with dry eyes, is a core symptom of **Sjögren's syndrome**, named for the Swedish physician who first described it. Sjögren's syndrome is an autoimmune disorder in which the body's white cells attack the glands that produce saliva and tears. It is a common cause of dry mouth in the elderly.

Although psychiatric disorders involving dry mouth are unusual, several cases have been reported of somatoform disorders in which dry mouth is a central symptom. Somatoform disorders are psychiatric disturbances characterized by external physical symptoms or complaints that are related to psychological problems rather than organic illness.

Diagnosis

The diagnosis of dry mouth is not difficult. The patient will state that his or her saliva is very thick or

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non-existent. Finding the cause of the dry mouth may be more difficult and require some laboratory testing. Salivary gland biopsy for stones or tumors should be performed if indicated.

Treatment

To treat dry mouth, the use of caffeine-containing beverages, alcoholic beverages, and mouthwashes containing alcohol should be minimized. Drinking water and fruit juices will decrease dry mouth problems. Chewing gum and lemon drops can be used to stimulate saliva flow. **Bitters** also can initiate salivary flow as long as the salivary glands and ducts are functional. Commercial saliva substitutes are available without prescription and can be used as frequently as needed. Use of a humidifier in the bedroom reduces nighttime oral dryness.

Herbal therapy

There are several herbal remedies that may be effective in increasing saliva production and preventing dry mouth. Drinking **ginger**, **chamomile**, or Chinese **green tea** at frequent intervals stimulates salivary flow. A Chinese herbal mix of ophiopogois, pinelliae tuber, zizyphi fructus, glycyrrhiaze, ginseng radix, and oryzae semen has been evaluated as treatment for dry mouth. Studies have shown this formula is effective in relieving dry mouth in half of those tested, including severe cases, such as **cancer** patients undergoing radiation therapy.

Nutritional therapy

Because dry mouth often causes **gum disease**, patients should take **vitamin C** and beta-carotene supplements as a preventive measure.

Acupuncture

Acupuncture has been tried since the late 1990s as a treatment for dry mouth caused by cancer treatments. Practitioners at a California clinic that offers acupuncture to cancer patients use a total of eight needles, to stimulate three points on each ear and one on each index finger. Of the 50 patients who have been treated with acupuncture in this clinic, 35 reported significant improvement in their salivation, and 13 reported that the improvement lasted for over three months before they required another treatment.

Allopathic treatment

Treatment of dry mouth involves management of the underlying condition. If dry mouth is caused by medication, the medication should be changed. If dry mouth is caused by blockage of the salivary ducts, the cause of the blockage should be investigated. When such systemic diseases as diabetes and anemia are brought under control, dry mouth problems may decrease.

Some new medications have been developed to treat dry mouth associated with cancer therapy and Sjögren's syndrome. Amifostine (Ethyol), a medication that protects the cells of the mouth against radiation and chemotherapy agents, has been approved by the U.S. Food and Drug Administration (FDA) as a treatment for dry mouth related to cancer therapy. Pilocarpine hydrochloride (Salagen) is a drug that was approved in 1998 for treating dry mouth associated with Sjögren's syndrome; it works by stimulating the salivary glands to produce more moisture. A study published in 2002 indicates that pilocarpine also relieves dry mouth in cancer patients. Cevimeline (Evoxac) is a newer drug that was approved by the FDA in February 2000 for the treatment of dry mouth associated with Sjögren's syndrome. All three medications appear to give good results and to be well tolerated by patients.

Expected results

The prognosis for patients with xerostomia due to medication problems is good, if the offending agent can be changed. Dry mouth due to systemic problems may be eliminated or improved once the disease causing the dry mouth is under control. Persistent xerostomia can be managed well with saliva substitutes.

Prevention

A patient needs to ask his or her health care provider if any medication to be prescribed will cause dry mouth. Patients with persistent xerostomia need to practice good oral hygiene and visit a dentist on a regular basis; the lack of adequate saliva can cause severe dental decay. The salivary glands are very sensitive to radiation, so any patient scheduled for radiation therapy of the head and neck should discuss minimizing exposure of the salivary glands to radiation with the radiation therapy provider.

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ORGANIZATIONS

American Dental Association. 211 E. Chicago Ave. Chicago, IL 60611. (312) 440-2500. http://www.ada.org.

American Medical Association. 515 N. State Street, Chicago, IL 60612. (312) 464-5000. http://www.ama-assn.org.

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Dysbosis

Definition

Dysbiosis typically refers to a disorder of the gastro-intestinal tract occurring when there is a disturbance of the complex ecological balance between the microbial organisms in the gut and their human host.

Russian scientist and Nobel Prize winner Elie Metchniko (Llya Llyich Metchniko, 1845–1916), a colleague of Louis Pasteur (1822–1895), devised the term in the early twentieth century to denote the condition when healthy symbiosis of intestinal flora is disrupted bringing about a harmful relationship between the human host and the gastro-intestinal bacteria. Researchers afterward determined that such a non-infectious microbial overgrowth can occur in various locations inside the body, on the skin surface, or in the external environment.

Alex Vasquez, a widely published **chiropractic** and naturopathic doctor, writing in the *Journal of the Council on Nutrition of the American Chiropractic Association*, uses a broad definition of dysbiosis as "a relationship of non-infectious host-microorganism interaction that adversely affects the human host." He specifies the subtype of dysbiosis based on the location: "gastrointestinal, oral, sinus, genitourinary, dermatologic, or environmental." According to Vasquez, with multifocal dysbiosis in general the adverse physiologic and clinical consequences are "additive and synergistic."

Although it is difficult to obtain a culture of intestinal microorganisms and separate and count the various types of protozoa, bacteria, and fungi in a laboratory environment, using these methods, researchers identified as many as 500 different species. However, subsequent advances in DNA sequence-based technologies permitted a genetic analysis without the need for prior cultivation. This process, known as metagenomics, enabled a detailed ecological analysis of the gastrointestinal tract. Researchers Daniel N. Frank and Norman R. Pace, writing in 2008 in the journal *Current Opinion in Gastroenterology* reported that there may be as many as 40,000 bacterial species comprising the "collective gastrointestinal microbiome."

According to researchers Jason A. Hawrelak and Stephen P. Meyers, reporting in a 2004 review of the scientific literature on dysbiosis, intestinal microflora are involved with the synthesis of vitamins, stimulation of the immune system, digestion and absorption of nutrients, metabolism of drug and plant compounds, and in improving the function and motility of the gastro-intestinal system. Microflora also act to inhibit pathogens and aid in the production of short-chain fatty acids and polyamines. Beneficial lactic-acid producing lactobacilli and bifidobacteria, which constitute a major part of healthy human intestinal microflora, help increase bioavailability and absorption of minerals such as **calcium**, **copper**, **iron**, **magnesium**, and **manganese**.

Researchers concur that dysbiosis is a contributing factor in many chronic and degenerative diseases, including **irritable bowel syndrome** (IBS), **inflammatory bowel disease** (IBD), autoimmune disorders, **rheumatoid arthritis** and **ankylosing spondylitis**, atopic **eczema**, and mental and emotional disorders.

Eliminating toxins in the intestinal tract has been seen as a vital component of health maintenance for as

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long as 5,000 years. In **Ayurvedic medicine**, intestinal toxins were understood to be at the root of all disease.

There are differences in both quality and quantity of the commensal bacteria present in non-harmful relationship throughout the healthy gastro-intestinal tract. These bacteria are an integral part of the immune system and form a front-line defense. As many as 80% of the body's immune cells (lymphocytes) are present in the intestinal lining, positioned there to protect the system from the toxins, bacteria, viruses, and allergens found in the bowel contents.

Causes and symptoms

There are four patterns of intestinal dysbiosis, according to Leo Galland, MD, and Stephen Barrie, ND. These patterns are: putrefacation, deficiency, fermentation, and sensitization. Researchers have identified various factors that contribute to development of the patterns of dysbiosis:

- prolonged and repeated antibiotic drug use
- diets of high-fat, animal protein, and low-fiber
- psychological and physical stress
- immune system dysfunction
- processed foods, refined sugars, and food additives
- oral contraceptives
- long-term use of pharmaceutical pain medications
- geriatric deficiency of gastric hydrochloric acid

Common symptoms of dysbiosis include abdominal cramps and bloating, chronic **fatigue**, food **allergies** and intolerance, fluid retention, headaches, **tinnitus**, vertigo, unclear thinking, weight gain, **diarrhea** and/or **constipation**, flatulence, and gastro-intestinal disturbances such as irritable bowel syndrome (IBS).

Serious conditions such as **autism** and attention deficit hyperactivity disorder (ADHD) have been linked to overgrowth of the gastro-intestinal yeast, candida *(Candida albicans)*.

According to Marcelle Pick, an OB/GYN physician, women in the United States seek medical help for digestive disorders two to three times as often as men. Some research suggests that the hormones estrogen and progesterone may influence digestion. A decline in these ovarian hormones is strongly linked to symptoms of gastro-intestinal distress.

Diagnosis

Though there is not much scientific literature establishing diagnostic criteria for dysbiosis, some health practitioners suggest a comprehensive diagnostic stool analysis (CDSA) to determine the dysbiosis risk index based upon gut microbiology, pH, and short-chain fatty acids. Many studies of microbiota in the human GI tract have used fecal samples, but these samples may not accurately detect the micro flora along the entire GI tract, according to researchers. More accurate diagnostic tools may be required to distinguish the particular pattern of intestinal dysbiosis. This determination is crucial to developing and effective treatment plan.

Treatment

Dietary and nutritional therapies

The first and most important treatment is a change in the diet. Care must be taken to eliminate the foods that feed the unhealthy bacteria. A diet eliminating simple sugars and refined carbohydrates and low in fruit and starchy vegetables may help to keep yeast growth in check and eliminate the toxins created from fermentation. To assure lasting results, the diet should be adhered to for as long as one year, though relief from symptoms of various patterns of dysbiosis may be observed much earlier.

When it is determined that the dysbiosis is caused by bacteria and/or yeast, a supplementation with friendly probiotic organisms such as Lactobacillus and Bifidobacterium may be indicated. The best food sources of these bacteria are organic yogurt with live cultures and kefir. Some additional food sources are: **garlic**, onions, asparagus, artichokes, **chicory**, bananas, wheat, barley and rye, miso, tempeh, tamari, pickled daikon, and sauerkraut. **Probiotics** are also available in capsule form.

Prebiotics are non-digestible food ingredients that help promote and stimulate the growth and/or activity of beneficial bacteria. These include **fructooligosaccharides** (FOS), inulin, and galactooligosaccharides.

Herbal remedies

Some recommended herbal remedies include:

- An extract of the inner rind and seeds of grapefruit *(Citrus racemosa)* acts as a broad-spectrum natural antibiotic that is highly active against protozoa, bacteria, yeast, and some viruses.
- An extract of the western larch tree *(Larix occidentalis)*, which contains the water-soluble polysaccharide arabinogalactan with immune-enhancing properties. Arabinogalactans are also found in other plants and herbs, including echinacea (*Echinacea purpurea*) and tumeric *(Curcuma longa)*.
- Berberine, containing medicinal plants such as goldenseal *(Hydrastis canadensis)*, and Barberry (*Berberis vulgaris*), which studies have shown fight bacterial,

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KEY TERMS

Ankylosing spondylitis—A systemic rheumatic disease causing chronic inflammation (spondylitis) and stiffness in the spine, the lower back, and inflammation of other tissues throughout the body such as the eyes, heart, lungs, and kidneys. Over time, the inflamation may lead to a complete fusion of the vertebrae and loss of spinal mobility (ankylosis).

Autoimmune—An abnormal, overactive and misdirected immune response against substances and tissues in the body that are normally not recognized as a threat.

Candidiasis—A systemic infection caused by an imbalance of intestinal bacteria with an overgrowth of the yeast *Candida albicans*.

Leaky gut—Intestinal permeability caused by damage to the intestinal mucosa, which leads to increase in the toxic load placed on the liver.

Probiotics—Beneficial bacteria in the gastrointestinal tract essential to healthy digestion. Probiotics produce certain essential vitamins and provide protection from bacteria, parasites, viruses, yeasts, and fungi while promoting the breakdown of waste and toxins. The lactobacillus species is the best known of the many probiotics.

Short-chain fatty acids—End products of bacterial fermentation derived from the breakdown of complex carbohydrates by anaerobic micro-organisms in the large intestine.

viral, fungal, and parasitic infections with the alkaloid berberine.

- Kombucha (*Fungus japonicus*) tea, a fermented drink containing a colony of yeast and bacteria, helps correct the intestinal flora imbalance.
- Vitamin and mineral supplementation may help counteract the effects of malabsorption, maldigestion, and hypermetabolism that may be factors contributing to dysbiosis.
- Time-released capsules of oregano, and the extract hyperforin from St. John's Wort *(Hypericum perforatum)*, myrrh *(Commiphora molmol)* and thyme, clove, and anise may also help.

Prevention

Prevention of dysbiosis may involve lifestyle change that reduces physical and mental **stress**, adoption of a healthy diet, body cleansing, including periodic **fasting**, physical exercises, vitamin and mineral supplementation, and traditional and natural therapies that maximize general health and wellbeing.

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Clare Hanrahan

Dyslexia

Definition

Dyslexia is a kind of learning disability noted for spatial reversals and shifts and is sometimes described as a neurological disorder. It manifests as difficulties with reading, writing, spelling and sometimes math. Occasionally, balance, movement, and rhythm are affected. Persons with dyslexia frequently display above average to superior intelligence, gifted creativity and genius. Leonardo da Vinci, Albert Einstein, Walt Disney, and the Olympic multi-Gold Medal diving champion, Greg Louganis, are noted examples of persons with dyslexia.

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Symptoms of dyslexia

Inability to associate symbols with sounds and vice versa

Frequent word guessing

Confusion with verbal instructions without visual cues

Confused handedness

Difficulty sequencing items

Slow, soft spoken reading

Frequent mispronunciation of words when reading

Misperception of words, letters, and numbers moving or disappearing on a written page

Difficulty memorizing number facts and/or correctly doing math operations

(Illustration by Corey Light. Cengage Learning, Gale)

Description

Genetics is believed to be a deciding factor in whether or not a person develops dyslexia. The condition may appear as early as three months. One report suggested that as many as 5–15% of Americans are affected. The National Institute of Health (NIH) reports that up to 8% of American elementary school children may have the unique characteristics described originally in 1920 by Dr. Samuel Torrey Orton. Believing it first a condition of "cross lateralization of the brain," by which he meant that functions normally processed on the right side of the brain are processed on the left side in the person with dyslexia, Orton later modified his description of the condition as being a "mixed hemispheric dominance," by which he meant that the alteration of functions to the opposite side of the brain occurred sometimes, but not all the time.

Since the advent of magnetic resonance imaging (MRIs), scientists have been able to view dyslexia from another vantage point, ironically, a process imitating what happens inside the mind of a dyslexic individual, according to one educator with dyslexia, Ronald D. Davis. He describes the ordinary ability of the person with dyslexia to visualize an object from multiple points of view, a process which has a moving point of view and which is spatially unanchored. When presented with a word that is easily visualized as a known object, like horse, the dyslexic mind easily imagines the horse from multiple perspectives, and, so rapidly—somewhere between 400 to 2,000 times faster than those without dyslexia—visual cues are processed 'almost intuitively,' demonstrating great mastery of the objectified visual world. However, when it comes to processing sound, language, speaking, handwriting and understanding verbalized communication not associated with an object, like the words "the" or "and", a series of non-image disconnections leads to confusion, disorientation, and an inability to adequately make sense of key pieces of visual information. To the person with dyslexia, a simple seven word sentence may look like a three word sentence with four blank spaces here and there.

Causes and symptoms

Although an exact cause has not been identified, studies have identified differences in the way sound and visual information are processed between persons with and without dyslexia. In the dyslexic individual these differences create what one NIH scientist refers to as a "physiologic signature"—a unique brain pattern—perhaps the result of emphasized activity along dopamine related neuro-pathways. Dopamine is a neurotransmitter, a chemical substance acting in the brain that facilitates certain kinds of messages. According to one author, when dopamine levels are high, the person with dyslexia experiences time as moving very slowly outside themselves, and very fast inside; as if time stands still. This author also notes that when the person with dyslexia experiences episodes of disorientation, when words or sounds do not create a visual picture for them and their mind continues to try and solve the confusion visually, dopamine levels shift and change. This would seem to be consistent with some of the symptoms of dyslexia, such as inaccurate perceptions of time and a lot of day dreaming.

Symptoms may include:

- poor ability to associate symbols with sounds and vice versa
- frequent word guessing when reading, and an inability to retain meaning
- confusion when given verbal instructions unaccompanied by visual cues
- confused sense of spatial orientation, especially by reversing letters and numbers, and losing one's place frequently while reading, or skipping lines

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KEY TERMS

Acetylcholine—A chemical of nerve transmission involved with movement.

Attention Deficit Disorder (ADD)—A learning disability characterized by an inability to pay attention. It may be different from dyslexia in that dyslexic individuals are highly aware and able to pay attention, but unable to make sense of their perceptions.

Attention Deficit with Hyperactivity Disorder (ADHD)—A learning disability characterized by an inability to sit still or concentrate well. It has been demonstrated to be diagnostically different from dyslexia by speech and vocalization patterns.

Cross lateralization—A term used to describe what was believed to be a difference in the way the mind works in persons with and without dyslexia. It was believed that functions processed in the right half of the brain by a person without dyslexia were processed in the left half by a person with dyslexia.

Dopamine—A chemical of nerve transmission involved with pleasure and pain and some forms of movement.

Dyslexia—A term applied to a kind of learning disability particularly noted for reversals and spatial shifts, making reading, writing, spelling and math very difficult.

Koosh ball—A lightweight, "furry" ball of rubber band material used in Davis technique exercises for retraining neuropathways in the brain of a person with dyslexia.

Mind's eye—A term referring to an imaginary point from which the mind views what the eyes look at or what the imagination presents. In dyslexia, the mind's eye is unanchored to one location, and sends many signals to the brain about what it sees, which causes disabling confusion.

Mixed hemispheric dominance—A term later used to describe what was believed to be a difference in the way the mind works in persons with and without dyslexia. It was believed that functions processed in the right half of the brain by a person without dyslexia were sometimes processed in the left half by a person with dyslexia.

Monoamine oxidase (MAO) inhibitors—A group of anti-depressant drugs.

Neurotransmitter—A chemical substance that facilitates the passing of messages along nerve pathways. There are several different neurotransmitters used in the human nervous system, each with distinct effects on mood, movement and perception.

Point of view—In a person with dyslexia, this term is used to describe the angle from which their mind's eye views an object. This point of view may be unanchored and moving about, as if several different people were telling what they see all at the same time.

- having the perception that words, letters and numbers move around, disappear, or get bigger or smaller
- overlooking punctuation marks or other details of language
- slow, labored reading and speech may be difficult to understand, words often mispronounced and softly spoken
- confused sense of right and left handedness
- math concepts are difficult to learn, excessive daydreaming, and difficulty with time
- difficulty sequencing items
- difficulty with jigsaw puzzles, walking a chalk line straightly or other fine motor skill tasks.

Other more positive characteristics common with dyslexia include:

- primary ability of the brain to alter and create perceptions
- highly aware of their environment, intelligent, and above average curiosity
- intuitive, insightful, and having the extraordinary ability of thinking in pictures
- multi-dimensional perception (from various viewpoints almost simultaneously)
- vivid imagination
- experiencing thought as reality (confusing what they see with what they think they see), thereby being abundantly creative

Diagnosis

Diagnosis is difficult in part because symptoms can also result from other conditions and because no two individuals display the same symptoms. As a result, dyslexia can be viewed as a developmental condition, a "self-created condition," rather than as a disease. As each individual baby interprets visual data, and adapts to the environment accordingly,

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they develop their own individual and unique brain patterns. It is that developmental pattern that is consistent among people with dyslexia. When the individual's mind cannot make sense of the data, confusion and disorientation result; incorrect data is incorporated, causing the individual to make mistakes that leads to emotional reactions, primarily frustration. A behavior is adopted that constitutes a learning disability because it disables future learning and, ultimately, affects self esteem.

Sometimes the learning disorder of dyslexia is inaccurately paralleled to Attention Deficit Disorder (ADD) or Attention Deficit Hyperactivity Disorder (ADHD). In a 2003 study, distinguishable differences between the two **learning disorders** were readily apparent. Comparing 105 boys between the ages of eight and ten, from three different schools and cross divided into three different groups—35 boys diagnosed with ADHD not taking stimulant medication, 35 boys with dyslexia, and 35 boys without learning disabilities—the study found clear and diagnostically useful differences in speech related patterns between all groups. Since diagnosis of a learning disability may be made between parents and teachers or other school administrators on the basis of symptoms rather than clinical diagnostic testing, careful diagnosis is advisable.

Treatment

Ronald D. Davis, writing in *The Gift of Dyslexia* outlines an alternative and complementary treatment consistent with the "moving point of view" model. According to this model, and the reason why letters seem to change shape and float, why lines of print appear to move, and why words appear to be other than they are is that the dyslexic individual sees the world predominantly through his or her "mind's eye," rather than through his or her physiologic eye. In other words, the person with dyslexia more than all others, sees what he or she 'thinks' they see, rather than what their eyeballs see. To further complicate matters, they do this so quickly, they easily become confused when the multiple facets do not produce a solid view. The object of treatment proposed by Davis, a dyslexic individual himself, is to train the mind's eye to return to a learned, anchored, viewpoint when they realize they are seeing with their mind, and not with their eyeballs. This is accomplished with assessment testing, followed by one-on-one exercises that retrain mental perception pathways. Using the gifts of the dyslexic individual—their imagination and curiosity—these exercises involve creative physical activities, including the use of modeling clay, "koosh" balls, and movement training. Davis founded the Reading Research Council's Dyslexia Correction Center in 1982, and the Davis Dyslexia Association International, which trains educators and therapists, in 1995.

Another alternative treatment option seeks to address unmastered learning skills needed for reading and math. This system, called Audioblox, may be used one-on-one (especially for children) or in groups, and involves a series of mental exercises that address learning, focusing on the "deficits" of dyslexia. Treatment involves the purchase of a kit online that contains a book entitled *The Right to Read,* a supplementary manual, a computer program on CD to supplement Audioblox training, and teaching materials. The book is in two parts; first, an explanation of theory; second, the program itself, with exercises. The supplementary manual contains specialized programs for areas of deficit, including handwriting, spelling, math, preschool readiness, and high school or adult learning. The teaching materials include 96 colored blocks, representing each of six colors on each of the six sides of the block; a view blocking screen; colored cards with preprinted patterns; letter cards; a reading book with a story written in the 800 most common English words, and word cards; and, a demonstration video. The kit originates in England; pricing in America ranges approximately between $135 and $150.

Special education recommendations include helping a child stay organized and on task by keeping their desk and workplace free of extraneous, distracting materials; making more frequent, shorter assignments to increase confidence; providing positive, "immediate gratification" feedback; and short conferences or work contracts as needed.

Allopathic treatment

Allopathic medical treatment for dyslexia includes use of anti-motion drugs, addressing the symptoms of balance and coordination that results from visual perception alterations; stimulant drugs, such as Cylert or Ritalin, to address symptoms of low self esteem, restlessness, and distractibility, and 'nootropics' drugs, a class of drugs believed to improve cognitive function. The stimulant drugs may be more effective for learning disorders related to ADHD or ADD than for dyslexia. The drug Piracetam, a nootropic, although reported as a possible treatment for dyslexia, is also reported to have legal issues because it has not been approved for use in the United States by the Food and Drug Administration (FDA). Reported potential side effects of the stimulants include nervousness and **insomnia**, and are

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contra-indicated with **epilepsy**, **allergies**, blood pressure problems, or with use of monoamine oxidase (MAO) inhibitors. Long-term use of stimulants in children are reported to adversely affect growth, and may ironically depress the nervous system or lead to loss of consciousness. By reducing natural levels of stimulants in the brain, they may also cause dependence. The stimulants and nootropics are said to increase the effects of alcohol and amphetamines. Other possible interactions include use of anti-convulsants or anti-epileptics; tricyclic anti-depressants; anti-coagulants, like Coumadin; and atropine-like drugs that blocks the neurotransmitter acetylcholine.

Prognosis

If left unaddressed, a person with dyslexia may become functionally illiterate, able to function limited by their ability to read, spell, have their handwriting understood, or do arithmetic. Recognizing that dyslexia is a developed learning disorder affecting people of extraordinary curiosity, imagination and intelligence—people of genius, often—from a productive or functional point of view, dyslexia may contribute significantly, positively or negatively, to performance levels. From an emotional or psychological point of view, dyslexia affects self esteem, and promotes confusion and frustration that may contribute to under achievement.

Prevention

No method of preventing dyslexia is currently known. However, existing methods of treatment may prevent or reduce the secondary or indirect losses to individuals, society and culture that might otherwise occur. As the genetic aspects of dyslexia are revealed, genetic chromosomal modifications may prevent the expression of dyslexia in future generations. Wise use of present and future understandings will allow individuals with dyslexic gifts, individuals such as Leonardo daVinci, Albert Einstein, Walt Disney and Greg Louganis, to continue to contribute their genius and talents.

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Katy Nelson, N.D.

Dysmenorrhea

Definition

Dysmenorrhea is the occurrence of painful cramps during **menstruation**.

Description

More than half of all girls and women have dysmenorrhea (cramps), a dull or throbbing **pain** that usually centers in the lower mid-abdomen, radiating toward the lower back or thighs. Menstruating women of any age can experience cramps.

While the pain may be only mild for some women, others experience severe discomfort that can significantly interfere with everyday activities for several days each month. In fact, about 43% of women in the United States have pain so severe that it disrupts their daily lives and about 18% miss one or more days or work, school, or other activities each year because of menstrual cramps.

Causes and symptoms

Dysmenorrhea is called "primary" when there is no specific abnormality, and "secondary" when the pain is caused by an underlying gynecological problem. It is believed that primary dysmenorrhea occurs when

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KEY TERMS

Endometriosis—The growth of uterine tissue outside the uterus.

Hormone—A chemical messenger secreted by a gland and released into the blood, where it travels to distant cells to exert an effect.

Ovary—One of the two almond-shaped glands in the female body that produces the hormones estrogen and progesterone.

Ovulation—The monthly release of an egg from an ovary.

Progesterone—The hormone produced by the ovary after ovulation that prepares the uterine lining for a fertilized egg.

Uterus—The female reproductive organ that contains and nourishes a fetus from implantation until birth.

prostaglandins, hormone-like substances produced by uterine tissue, trigger strong muscle contractions in the uterus during menstruation. However, the level of prostaglandins does not seem to correlate with the strength of a woman's cramps. Some women have high levels of prostaglandins and no cramps, whereas other women with low levels have severe cramps. This is why experts assume that cramps must also be related to other causes, such as **diets**, genetics, **stress**, and different body types, in addition to prostaglandins. The first year or two of a girl's periods are not usually very painful. However, once ovulation begins, the blood levels of the prostaglandins rise, leading to stronger contractions.

Secondary dysmenorrhea may be caused by **endometriosis**, fibroid tumors, or an infection in the pelvis.

The likelihood that a woman will have cramps increases if she:

- has a family history of painful periods
- leads a stressful life
- does not get enough exercise
- uses caffeine
- has pelvic inflammatory disease (PID)

Symptoms include a dull, throbbing cramping in the lower abdomen that may radiate to the lower back and thighs. In addition, some women may experience **nausea** and **vomiting**, **diarrhea**, irritability, sweating, or **dizziness**. Cramps usually last for two or three days at the beginning of each menstrual period. Many women often notice their painful periods disappear after they have their first child, probably due to the stretching of the opening of the uterus or because the birth improves the uterine blood supply and muscle activity, although others do not notice a change.

Diagnosis

A doctor should perform a thorough pelvic exam and take a patient history to rule out any underlying condition that could cause cramps.

Treatment

Nutritional therapy

The following dietary changes may help prevent or treat menstrual pain:

- Increased dietary intake of foods such as fiber, calcium, soy foods, fruits and vegetables.
- Decreased consumption of foods that exacerbate PMS. They include caffeine, salt and sugar.
- Quitting smoking. Smoking has been found to worsen cramps.
- Taking daily multi-vitamin and mineral supplements that contain high doses of magnesium and vitamin B_6 (pyridoxine), and flaxseed or fish oil supplements. Recent research suggests that vitamin B supplements, primarily vitamin B_6 in complex, magnesium, calcium, zinc, vitamin E, and fish oil supplements (omega-3 fatty acids) also may help relieve cramps.

Herbal therapy

An herbalist may recommend one of the following herbal remedies for menstrual pain:

- Chasteberry (*Vitex agnus-castus*) for women who also experience breast pain, irregular periods, and ovarian cysts.
- Dong quai (*Angelica sinensis*) for women with typical menstrual pain.
- Licorice (*Glycyrrhiza glabra*) for abdominal bloating and cramping.
- Black cohosh (*Cimifuga racemosa*) for relief of menstrual pain as well as mood swing and depression.

Yoga

Several **yoga** positions are popular as methods to ease menstrual pain. In the "cat stretch" position, the woman rests on her hands and knees, slowly arching the back. The pelvic tilt is another popular yoga position, in which the woman lies with knees bent, and then lifts the pelvis and buttocks.

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Exercise

Exercise may be a way to reduce the pain of menstrual cramps through the brain's production of endorphins, the body's own painkillers.

Other remedies

Acupuncture and Chinese herbs are other popular alternative treatments for cramps. There are particular formulas depending on the pattern of imbalance. **Aromatherapy** and massage may ease pain for some women. Transcutaneous Electrical Nerve Stimulation (TENS) has been touted as a safe and practical way to relieve the pain of dysmenorrhea. It works by using electrodes to stimulate nerve fibers. Some women find relief through visualization, concentrating on the pain as a particular color and gaining control of the sensations. Others find that imagining a white light hovering over the painful area can actually lessen the pain for brief periods. Simply changing the position of the body can help ease cramps. The simplest technique is assuming the fetal position with knee pulled up to the chest while hugging a heating pad or pillow to the abdomen. Also, orgasm can make a woman feel more comfortable by releasing tension in the pelvic muscles.

Allopathic treatment

Several drugs can lessen or completely eliminate the pain of primary dysmenorrhea. Most popular are the non-steroidal anti-inflammatory drugs (NSAIDs), which prevent or decrease the formation of prostaglandins. These include aspirin, ibuprofen (Advil), and naproxen (Aleve). For more severe pain, prescription strength ibuprofen (Motrin) is available. These drugs are usually begun at the first sign of the period and taken for a day or two.

If an NSAID is not available, acetaminophen (Tylenol) may also help ease the pain. Heat applied to the painful area may bring relief, and a warm bath twice a day also may help.

Studies of a drug patch containing glyceryl trinitrate to treat dysmenorrhea suggest that it also may help ease pain. This drug has been used in the past to ease preterm contractions in pregnant women.

In 2002, an intrauterine device (IUD) was introduced to help eliminate the pain of menstrual cramps related to endometriosis. The IUD, known as Mirena, is approved for use in the Untied States as a contraceptive.

Expected results

Treatments should lessen or eliminate pain.

Prevention

Avoidance of **caffeine**, alcohol, and sugar prior to onset of period and NSAIDs taken a day before the period begins should eliminate cramps for some women.

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ORGANIZATIONS

American College of Obstetricians and Gynecologists. 409 12th St. SW, Washington, DC 20024. (202) 638-5577.

Federation of Feminist Women's Health Centers. 633 East 11th Ave., Eugene, OR 97401. (503) 344-0966.

National Women's Health Network. 1325 G St. NW, Washington, DC 20005. (202) 347-1140.

Mai Tran
Teresa G. Odle

Dyspepsia *see* **Indigestion**

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E

Ear acupuncture *see* **Auriculotherapy**

Ear infection

Definition

Otitis media is an infection of the middle ear space, which lies behind the eardrum (tympanic membrane). It is characterized by **pain**, **dizziness**, and partial loss of hearing.

Description

A little knowledge of the basic anatomy of the middle ear will be helpful for understanding the development of otitis media. The external ear canal is a tube that leads from the outside opening of the ear to a structure called the tympanic membrane. Behind the tympanic membrane is the space called the middle ear. Within the middle ear are three tiny bones called ossicles. These are the malleus, the incus, and the stapes. Their shapes are often described as a hammer, an anvil, and a stirrup. Sound in the form of vibration causes movement in the eardrum, and then in the chain of ossicles. The ossicles transmit the sound to the cochlea within the inner ear, which sends it to the brain for processing.

The nasopharynx is the passageway behind the nose that takes inhaled air into the breathing tubes leading to the lungs. The eustachian tube is a canal that runs between the middle ear and the nasopharynx. One of the functions of the eustachian tube is to keep the air pressure in the middle ear equal to that outside. This equalization of the air pressure allows the eardrum and ossicles to vibrate appropriately, so that hearing is normal.

By age three, almost 85% of all children will have had otitis media at least once. It is the most common pediatric complaint. Babies and children between the ages of six months and six years are most likely to develop otitis media. Children at higher risk for otitis media include boys, children from poor families, those with **allergies**, Native Americans, Native Alaskans, children born with cleft palate or other defects of the structures of the head and face, and children with Down syndrome. Babies whose first ear infection occurs prior to six months of age are more prone to chronic problems with otitis media. There also appears to be some genetic predisposition towards otitis media, which may be related to the structure and function of the area in and around the middle ear. Exposure to cigarette smoke significantly increases the risk of ear **infections**, as well as other problems affecting the respiratory system. In addition, children who enter daycare at an early age have more upper respiratory infections (URIs or colds), and thus more cases of otitis media. Although the ear infection itself is not contagious, the URIs that predispose children to them certainly are. The most common times of year for otitis media to strike are winter and early spring, which are the same times that URIs are most common.

Otitis media is an important medical problem because it often results in fluid accumulation within the middle ear. This is known as otitis media with effusion (OME). The effusion can last for weeks to months. Effusion within the middle ear can cause significant hearing impairment. When such hearing impairment occurs in a young child, it may interfere with the development of normal speech and language processing. A chronic effusion also increases the risk for subsequent infections, as the fluid provides a growth medium for bacteria.

In adults, acute otitis media can lead to such complications as paralysis of the facial nerves. Recovery from these complications may take from two weeks to as long as three months.

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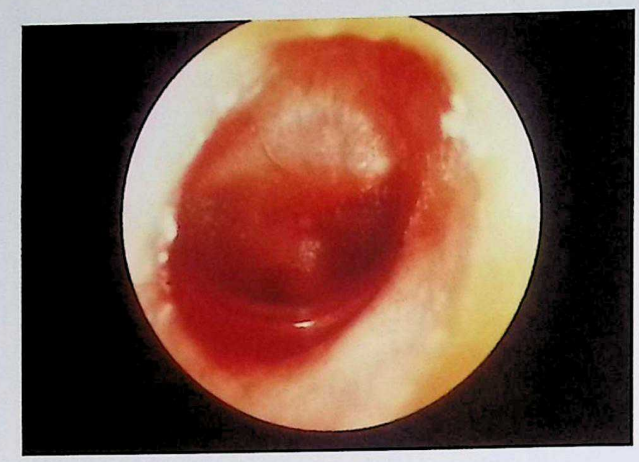

A photograph of the eardrum, through the ear using an otoscope, in a patient with otitis media, an ear infection. *(© Medical-on-Line / Alamy)*

KEY TERMS

Adenoid—A collection of lymph tissue located in the nasopharynx.

Effusion—A collection of fluid that has leaked out into some body cavity or tissue.

Eustachian tube—A small tube that runs between the middle ear space and the nasopharynx.

Fomite—An inanimate object that can transmit infectious organisms.

Myringotomy—A surgical procedure performed to drain an infected middle ear. A newer type of myringotomy uses a laser instead of a scalpel.

Nasopharynx—The part of the airway leading into the nose.

Ossicles—Tiny bones located within the middle ear that convey the vibrations of sound through to the inner ear.

Perforation—A hole that develops in a body tissue. In otitis media, the eardrum sometimes perforates because of the pressure of fluid behind it.

Topical—Referring to a medication applied to the skin or outward surface of the body. Ear drops are one type of topical medication.

Causes and symptoms

The first precondition for the development of acute otitis media is exposure to an organism capable of causing the infection. Otitis media can be caused by either viruses or bacteria. Virus infections account for about 15% of cases. The three most common bacterial pathogens are *Streptococcus pneumoniae*, *Haemophilus influenzae*, or *Moraxella catarrhalis*. About 75% of ear infections caused by *S. pneumoniae* are reported to be resistant to penicillin.

Otitis media may also be caused by other disease organisms, including *Bordetella pertussis*, the causative agent of **whooping cough**, and *Pneumocystis carinii*, which often causes opportunistic infections in patients with **AIDS**.

There are other factors that make the development of an ear infection more likely. Because the eustachian tube has a more horizontal orientation and is considerably shorter in early childhood, material from the nasopharynx can easily reach the middle ear. Discharges from the nasopharynx include infection-causing organisms. Children also have a lot of lymph tissue, some of which makes up the adenoids, in the area of the eustachian tube. The adenoids may enlarge with repeated respiratory tract infections, ultimately blocking the eustachian tubes. When the eustachian tube is blocked, the middle ear is more likely to fill with fluid. This fluid increases the risk of infection, and the corresponding risks of **hearing loss** and delayed speech development.

Recent advances in gene mapping have led to the discovery of genetic factors that increase a child's susceptibility to otitis media. Researchers are hoping to develop molecular diagnostic assays that will help to identify children at risk for severe ear infections.

Most cases of acute otitis media occur during the course of a URI. Symptoms may include cold symptoms, **fever**, ear pain, irritability, and problems with hearing. Babies may have difficulty feeding. When significant fluid is present within the middle ear, pain can increase depending on position. Lying down may cause an increase in painful pressure within the middle ear, so that babies often fuss if not held upright. Older children sometimes complain of a full sensation in the affected ear. If the fluid build-up behind the eardrum is sufficient, the eardrum may develop a hole (perforate), causing bloody fluid or greenish-yellow pus to drip from the ear. Although the pain may be severe before the eardrum perforates, the pain is usually relieved by the reduction of pressure brought on by a perforation.

Diagnosis

Diagnosis is usually made simply by looking at the eardrum through a special lighted instrument called an otoscope. The eardrum will appear red and swollen,

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and may appear either abnormally drawn inward, or bulging outward. Under normal conditions, the ossicles create a particular pattern on the eardrum, referred to as "landmarks." These landmarks may be obscured in the course of an infection. Normally, the light from the otoscope reflects off the eardrum in a characteristic fashion. This is called the "cone of light." In an infection, this cone of light may be shifted or absent.

A special attachment to the otoscope allows the examiner to blow a puff of air gently into the ear. Normally, this should cause movement of the eardrum. In an infection, or when there if fluid behind the eardrum, this movement may be decreased or absent. Movement of the eardrum can also be assessed by a tympanogram. A tympanogram is a quick, painless test. If there is fluid in the middle ear, the tympanogram reading will be flat. If the middle ear is filled with air, as it is normally, the test will also show whether it is at higher or lower pressure than it should be. This measurement could be an indicator of abnormal function of the eustachian tube.

Hearing tests, or audiograms, are sometimes used to determine whether hearing loss has occurred because of infection or persistent fluid, and whether the loss is severe. A hearing screen for children old enough to describe their own hearing reliably can be performed in schools or at the pediatrician's office. More accurate testing is done in a soundproof booth by an audiologist. This method can also be modified for use with children who can not give a verbal indication that they have heard a sound, but are old enough to turn their heads to see the source of a noise.

Fluid or pus draining from the ear can be collected. This sample can then be processed in a laboratory to allow any organisms present to multiply sufficiently (cultured) to permit the organisms to be viewed under a microscope and identified. Cultures are also used to determine the sensitivity of the organisms to specific antibiotics.

Treatment

Chiropractic

One particular **chiropractic** procedure, known as the endonasal technique, is thought to help the eustachian tube to open and thus improve drainage of the middle ear. The tube is sometimes blocked off due to exudates or inflammatory processes. The endonasal technique can offer significant relief from **earache**.

Craniosacral therapy and osteopathy

Craniosacral therapy uses gentle manipulation of the bones of the skull to relieve pressure and improve eustachian tube function. This treatment may also help the eustachian tubes to assume a position in which they can drain on their own. The pressure exerted on a baby's head during the birth process sometimes contributes to the tubes being in a position in which it is hard for them to drain. Osteopaths practice a similar gentle manipulation of the bones of a child's head. One osteopathic study of children from kindergarten through third grade in a Missouri school district found a direct correlation between abnormal head shape at birth and susceptibility to otitis media during the early elementary school years. Pediatric osteopaths specialize in cranial work in children.

Herbal therapy

A number of herbal treatments for otitis media have been recommended, including eardrops made with **goldenseal** (*Hydrastis canadensis*), **mullein** (*Verbascum thapsus*), **St. John's wort** (*Hypericum perforatum*), and **echinacea** (*Echinacea* spp.). Tinctures of echinacea, **thyme** (*Thymus vulgaris*), and elderflower (*Sambucus nigra*) are often recommended for oral treatment of otitis media due to chronic congestion. Warm **garlic** oil can be instilled directly into the ear. Steam inhalation infused with **eucalyptus** or **chamomile** may reduce the congestion of the URIs that often accompany otitis media.

Homeopathy

Homeopathic remedies that may be prescribed for middle ear infections include **aconite**, ferrum phosphoricum, **belladonna**, chamomilla, **lycopodium**, **pulsatilla**, or **silica**.

Nutrition

Some practitioners believe that food allergies may increase the risk of ear infections, and they suggest eliminating suspected food allergens from the diet. The top food allergens are wheat, dairy products, corn, peanuts, citrus fruits, and eggs. Elimination of sugar and sugar products can allow the immune system to work more effectively. Other nutritionists have noted that children who were breastfed as babies are less susceptible to ear infections.

Acupuncture

Acupuncture can help to reestablish a normal flow of fluids within the head. This form of treatment may also enhance the immune system.

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Allopathic treatment

Medications

Antibiotics are the treatment of choice for acute otitis media (AOM). Different antibiotics are used depending on the type of bacteria most likely to be causing the infection. This decision involves knowledge of the types of antibiotics that have worked on other ear infections occurring within a particular community at a particular time. Options include sulfa-based antibiotics, as well as a variety of penicillins, cephalosporins, and others. The patient's sensitivity to certain medications, as well as previously demonstrated resistant **strains**, also contributes to the choice of antibiotic. An 0.3% topical solution of ofloxacin has been recommended as a more effective medication than other oral or topical antibiotics.

Following a course of antibiotic treatment, approximately 40% of children will continue to have fluid behind the eardrum, resulting in otitis media with effusion (OME). The eardrum is no longer red or infected. The fluid may take weeks to months to resolve. Generally, it is safe to allow this condition to continue with observation for up to 12 weeks. At that time, hearing should be tested. If hearing loss is insignificant or only in one ear, observation can continue for up to a total of 4–6 months, at which time placement of ventilation tubes in the eardrum is often recommended. The tube functions as an accessory eustachian tube until it falls out. If hearing loss is significantly affecting both ears at any time after six weeks from diagnosis of OME, antibiotic treatment or tube placement should be considered.

The overuse of antibiotics is contributing to some strains of bacteria—particularly *S. pneumoniae*—developing resistance and becoming more difficult to treat. Research is being done to try to help determine whether there may be some ear infections that would resolve without antibiotic treatment. One pediatrician has suggested some changes in usage of antibiotics for otitis media. He describes five factors to use to determine whether antibiotic treatment can be limited to five days or perhaps avoided altogether. The factors to consider are the age of the child; time of year; severity of the infection; frequency of infection; and rapidity of response to antibiotics. Generally, otitis media clears more readily when it occurs in an older child, in the summer, and causes relatively mild symptoms in a child who has not experienced frequent infections in the past. Given these factors, it may be possible to avoid antibiotic use. The patient must be monitored to be sure the infection clears without complication. If antibiotic treatment is initiated and the infection clears quickly, a five-day course of medication may be all that's needed.

Whether or not antibiotics are used, such pain relievers as Tylenol or Motrin can be very helpful in reducing the pain and inflammation associated with otitis media.

The use of decongestants and antihistamines does not appear to shorten the course of infection.

Surgery

In a few rare cases, a surgical perforation to drain the middle ear of pus may be performed. This procedure is called a myringotomy. The hole created by the myringotomy generally heals itself in about a week. In 2002 a minimally invasive procedure was introduced that uses a laser to perform the myringotomy. It can be performed in the doctor's office and heals more rapidly than the standard myringotomy.

Although some doctors have recommended removing the adenoids to prevent recurrent otitis media in young children, recent studies indicate that surgical removal of the adenoids does not appear to offer any advantages over a myringotomy as a preventive measure.

Expected results

With treatment, the prognosis for acute otitis media is very good. Long-lasting accumulations of fluid within the middle ear, however, place the patient at risk both for difficulties with hearing and speech, and for the repeated development of ear infections. Without treatment, otitis media occasionally leads to serious complications, including an infection within the nearby mastoid bone, called mastoiditis.

Prevention

Although otitis media seems inevitable in childhood, some measures can be taken to decrease the chance of repeated infections and fluid accumulation. Breastfeeding provides some protection against URIs, which in turn protects against the development of otitis media. If a child is bottle-fed, parents should be advised to feed him or her upright, rather than allowing the baby to lie down with the bottle. General good hygiene practices (especially hand washing) help to decrease the number of upper respiratory infections in a household or daycare center. Hand sanitizers are preferable to antibacterial soaps, which may contribute to bacterial resistance.

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The use of pacifiers should be avoided or limited. They may act as fomites, particularly in a daycare setting. In children who are more susceptible to otitis media, pacifier use can increase by as much as 50% the number of ear infections experienced.

Two vaccines can prevent otitis media associated with certain strains of bacteria. One is designed to prevent **meningitis** and other diseases, including otitis media, that result from infection with *Haemophilus influenzae* type B. Another is a vaccine against *Streptococcus pneumoniae*, a very common cause of otitis media. Children who are at high risk or have had severe or chronic infections may be good candidates for these vaccines; in fact, a recent consensus report among pediatricians recommended routine administration of the pneumococcal conjugate vaccine to children younger than two years, as well as those at high risk for AOM. Parents should consult a health care provider concerning the advisability of this treatment.

Another vaccine that appears to lower the risk of AOM in children is the intranasal vaccine that was recently introduced for preventing **influenza**. Although the flu vaccine was not developed to prevent AOM directly, one team of researchers found that children who were given the vaccine before the start of flu season were 43% less likely to develop AOM than children who were not vaccinated.

As of early 2003, there was no vaccine effective against *M. catarrhalis*. Researchers are working on developing such a vaccine, as well as a tribacterial vaccine that would be effective against all three pathogens that commonly cause otitis media.

A nutrition-based approach to preventive treatment is undergoing clinical trials as of late 2002. This treatment involves giving children a dietary supplement of lemon-flavored cod liver oil plus a multivitamin formula containing **selenium**. The pilot study found that children receiving the supplement had fewer cases of otitis media, and that those who did develop it recovered with a shorter course of antibiotic treatment than children who were not receiving the supplement.

After a child has completed treatment for otitis media, a return visit to the practitioner should be scheduled. This visit should occur after the course of antibiotic has been completed. It allows the practitioner to evaluate the patient for the persistent presence of fluid within the middle ear. In children who have a problem with recurrent otitis media, a small daily dose of an antibiotic may prevent repeated full attacks of otitis media. In children who have frequent bouts of otitis media or persistent fluid, a procedure to place ventilation tubes within the eardrum may help to equalize pressure between the middle ear and the outside, thus preventing further fluid accumulation.

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American Academy of Otolaryngology, Head and Neck Surgery, Inc. One Prince Street, Alexandria, VA 22314-3357. (703) 836-4444.

American Academy of Pediatrics (AAP). 141 Northwest Point Boulevard, Elk Grove Village, IL 60007. (847) 434-4000. www.aap.org.

American Osteopathic Association (AOA). 142 East Ontario Street, Chicago, IL 60611. (800) 621- 1773. www.aoa-net.org.

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Earache

Definition

An earache is a commonly used term for ear **pain** or discomfort that is a symptom of disease or injury.

Description

An earache itself is not a disease, but it is a symptom of disease or injury in the external or middle ear. It may also be a symptom of problems in the mouth, nose, or throat. Infants or very young children may be unable to say that they are in pain. Increased irritability or pulling at the ears is often a sign of ear pain in infants.

Causes and symptoms

The most common cause of an earache is a buildup of pressure in the eustachian tube. Among other functions, the eustachian tube drains fluids out of the middle ear via the back of the throat. A cold, allergy, or **sore throat** can cause the eustachian tube to swell shut. Infants and young children are especially susceptible to earaches caused by problems with the eustachian tube, since the structure is still underdeveloped in that age group. When the normal drainage of fluid is prevented, it can accumulate in the middle ear, causing pressure, pain, stagnation, and possibly infection.

An earache may be due to a perforated, or broken, eardrum. The eardrum can be broken as a result of a blow to the head, infection in the inner ear, suction applied to the ear, or the insertion of a foreign object into the ear. **Infections** of the middle and outer ears are often associated with earaches. Other causes of an earache may be the obstruction of the ear canal with a foreign object or excessive ear wax, **boils** in the ear canal, a herpes zoster infection of the ear, keratosis of the ear, tumors, an infection of the mastoid process, "swimmer's ear," and the aftermath of surgical procedures. Ear pain can also be caused by a rapid descent from high altitudes, during air travel or travel in the mountains. A **sinus infection**, arthritis of the jaw, sore throat, **tonsillitis**, and dysfunction of the temporomandibular joint (TMJ) may be the source of referred pain to the ears.

Diagnosis

A history of the illness should be obtained, including information about the symptoms accompanying the earache. A physical exam should be performed, which may include an examination of the ears, the nasal passages and sinuses, and the throat. An otoscope may be used to see more deeply into the ears, nose, and throat. In addition, the teeth, tongue, tonsils, salivary glands, and TMJ should be examined for problems that might be causing referred pain to the ears. A culture and sensitivity test should be done if there is any discharge from the ears. X rays or a computed tomography (CT) scan may be required to diagnose the problem. Hearing and balancing tests are important to the diagnosis of an earache.

Treatment

Three to five drops of the warmed oil extract of **mullein** flowers (*Verbascum thapsus*), **garlic** (*Allium sativa*), or **St. John's wort** (*Hypericum perforatum*), or a combination of any of the three should be placed into the affected ear. The oil of *Calendula officinalis* may be used in the same manner. If there is a persistent **ear infection**, **goldenseal** (*Hydrastis canadensis*) salve or tincture can be placed directly onto the outer ear or into the ear canal three to four times per day. Glycerin can be introduced into the ear if it is suspected that excessive earwax or water in the ear is causing the problem.

Food and environmental **allergies** should be considered as contributors to the development of ear pain and infections, especially if the earache is chronic or

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KEY TERMS

Computed tomography (CT) scan—A medical procedure where a series of x rays are taken and put together by a computer in order to form detailed pictures of areas inside the body.

Eustachian tube—A canal extending from the middle ear to the pharynx.

Mastoid process—The rounded protrusion of bone that can be felt just behind the ear.

Middle ear—The inner portion of the ear made up of an air-filled chamber, which is separated from the outer ear by the tympanic membrane.

Otoscope—A lighted medical instrument that can be used to visualize the ear canal and the tympanic membrane.

Swimmer's ear—An inflammation or infection of the ear canal due to overexposure to water.

Temporomandibular joint (TMJ)—The joint responsible for movement of the jawbone.

recurrent. Allergy testing should be done, and then the allergens should be avoided. Alcohol, dairy products, **smoking**, **caffeine**, sugary foods, and processed foods should also be avoided to keep from stressing the immune system. One or two cloves of raw garlic daily may help end chronic episodes of earache, since garlic can kill many of the pathogens that cause earaches. If there is trouble tolerating raw garlic, a daily garlic supplement can be taken instead. Daily supplementation of **vitamin C**, **bioflavonoids**, **zinc**, and **beta carotene** is recommended to treat some of the underlying conditions causing ear pain and bolster general immune function.

Several homeopathic remedies may also be helpful in treating earaches. Depending upon the symptoms, a 6C or 12C dose of **Pulsatilla**, Mercurius, or Hepar sulphuris, or a 30C dose of **Belladonna** can be taken for up to four doses. If there is no symptom relief, a homeopath or other healthcare practitioner should be consulted.

Hydrotherapy treatment for earaches includes the use of hot compresses. To make a compress, a large cloth soaked in hot water should be placed over both ears and the throat for about five minutes. A hot water bottle or smaller compress can also be used. A new hot compress can be used every three to five minutes until the earache is relieved for a maximum of 30 minutes. This treatment is best when the feet are in a hot footbath while the compresses are being applied. Hot water can be added as needed to keep the water comfortably hot. The soak can be repeated two or three times a day as needed.

Massage such as tui na or **reflexology** can be helpful in clearing up ear pain, congestion, and TMJ dysfunction. A knowledgeable practitioner should be consulted.

Allopathic treatment

If an earache is accompanied by any of the following symptoms, a healthcare provider should be consulted as soon as possible:

- severe pain
- discharge from the ear
- a fever of 102°F (38.8°C) or higher
- a sudden change in hearing
- a sudden onset of dizziness
- an inability to concentrate
- facial muscle weakness
- the earache lasts for more than a few days
- the earache is worse during chewing
- there is sudden or severe ear pain without any other accompanying symptoms
- the earache does not respond to home treatment
- the earache appears to be getting worse
- pain, tenderness, or redness of the over the area of the mastoid process, which often indicates a serious infection

Antibiotics, decongestants, and antihistamines are often prescribed to halt the infection and inflammation that may be the cause of ear pain. The insertion of ear tubes may be recommended for children who have persistent ear infections to reestablish proper functioning of the middle ear. However, the effectiveness of this treatment is still widely debated. Repeated swallowing or gum-chewing can relieve ear pain caused by changes in pressure secondary to changes in altitude. Allowing infants and young children to suck on a bottle during descent can help relieve popping and ear pain. TMJ dysfunction should be evaluated by a dentist. Anti-inflammatory medication, tranquilizers, or muscle relaxants may be prescribed for temporary relief. Other treatments for TMJ problems include braces to correct the bite or a bite plate to wear when sleeping.

Expected results

Earaches can generally be relieved by attending to the underlying problem. Untreated problems may lead

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to serious ear damage and possible **hearing loss**. Most children with chronic earaches due to infections tend to outgrow the condition.

Prevention

A hair dryer or other method should be used after swimming if there is a tendency for the ears to retain water. Earplugs should be worn while swimming and cotton or wool should be loosely inserted into the outer ear canal during showers or when the hair is being washed. Objects such as cotton swabs should not be inserted into the ear canal. A healthy immune system should be maintained to reduce the opportunity for infections.

Resources

OTHER

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Patience Paradox

Eastern red cedar *see* **Juniper**

Eating disorders *see* **Anorexia nervosa; Binge eating disorder; Bulimia nervosa**

Echinacea

Description

Echinacea, commonly known as purple coneflower, is a perennial herb of the Composite family, commonly known as the daisy family. In addition to being known as purple coneflower, this hardy plant is also sometimes called Sampson root, Missouri snakeroot, coneflower, American coneflower, and rudbeckia. The prominent, bristly seed head inspired the generic name of the plant, taken from the Greek word, *echinos* meaning hedgehog.

Echinacea is a North American prairie native, abundant in the mid west and cultivated widely in ornamental and medicinal gardens. The purple-pink rays of the blossom droop downward from a brassy hued center cone composed of many small, tubular florets. The conspicuous flowers bloom singly on stout, prickly stems from mid-summer to autumn. Flower heads may grow to 4 in (10 cm) across. The dark green leaves are opposite, entire, lanceolate, toothed, and hairy with three prominent veins. The narrow upper leaves are attached to the stem with stalks. The lower leaves are longer, emerging from the stem without a leaf stalk, and growing to 8 in (20 cm) in length. The plant develops deep, slender, black roots. Echinacea propagates easily from seed or by root cuttings. However, due to its increasing popularity as an herbal supplement, echinacea is numbered among the 19 medicinal plants considered at risk by the nonprofit organization United Plant Savers.

General use

Three species of echinacea are used medicinally: *Echinacea augustifolia, E. purpurea*, and *E. pallida*. The entire plant has numerous medicinal properties that act synergistically to good effect.

Native American plains Indians relied on echinacea as an all-purpose antiseptic. The Sioux valued the root as a remedy for snake bite, the Cheyenne chewed the root to quench thirst, and another tribe washed their hands in a decoction of echinacea to increase their tolerance of heat. European settlers learned of the North American herb's many uses, and soon numerous echinacea-based remedies were commercially available from pharmaceutical companies in the United States. Echinacea was a popular remedy in the United States through the 1930s. It was among many medicinal herbs listed in the *U.S. Pharmacopoeia*, the official U.S. government listing of pharmaceutical raw materials and recipes. The herb fell out of popular use in the United States with the availability of antibiotics. In West Germany, more than 200 preparations are made from the species *E. purpurea*. Commercially prepared salves, tinctures, teas, and extracts are marketed using standardized extracts. Echinacea is regaining its status in the United States as a household medicine-chest staple in many homes. It is one of the bestselling herbal supplements in the United States.

In the early twenty-first century, echinacea is most often used to boost the immune system and fight infection. Research has shown that echinacea increases production of interferon in the body. It is antiseptic and antimicrobial, with properties that act to increase the number of white blood cells available to destroy bacteria and slow the spread of infection. As a depurative, the herbal extract cleanses and purifies the bloodstream and has been used effectively to treat **boils**. Echinacea is vulnerary, promoting wound healing through the action of a chemical substance in

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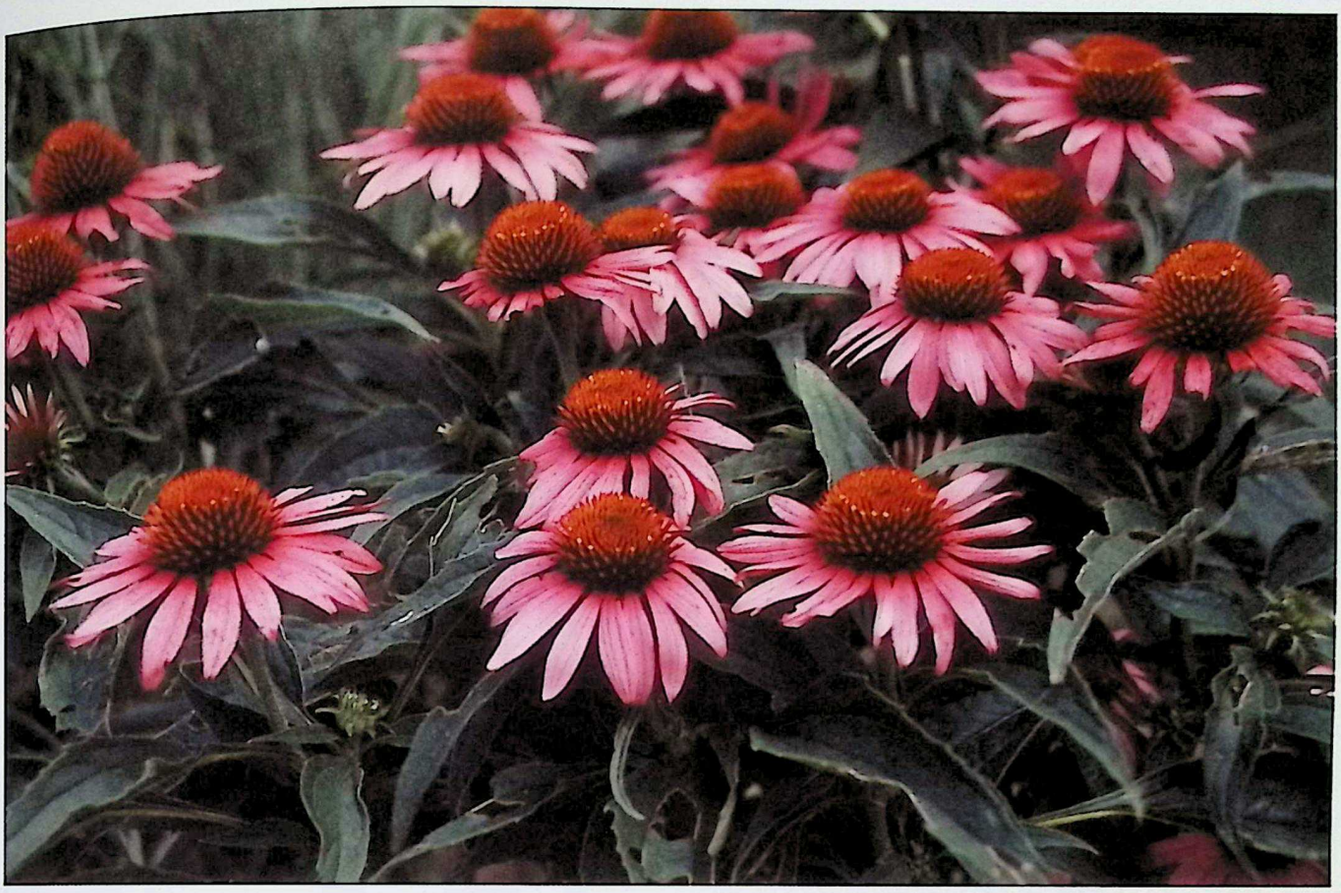

Echinacea, close-up of deep pink and purple coneflowers, used in herbal medicine. *(© Photo Researchers, Inc. Reproduced by permission.)*

the root known as caffeic acid glycoside. As an alterative and an immuno-modulator, echinacea acts gradually to promote beneficial change in the entire system. It has also been used to treat urinary infection and *Candida albicans* **infections**. Echinacea is a febrifuge, useful in reducing fevers. It is also useful in the treatment of **hemorrhoids**. A tincture, or a strong decoction, of echinacea serves as an effective mouthwash for the treatment of pyorrhea and gingivitis.

The various uses of echinacea were the subject of clinical research in the 2000s. Echinacea appears to be a complex plant, containing many different active substances. A study published in January 2008 stated that two different substances found in echinacea appeared to have opposite effects when applied to a certain type of human cells. Many other studies, instead of focusing on certain compounds applied to only one type of human cell, tried to evaluate echinacia's effectiveness in treating diseases and conditions for which it is commonly taken. One such study, published in 2002 in the *Annals of Internal Medicine* found that taking echinacea had no significant effect on the **common cold**. However, another study, published in 2007 found that taking echinacea reduced the likelihood of getting a common cold by 58% and decreased the average duration of the cold by 1.4 days. These types of seemingly contradictory results make echinacea research an active and strongly debated field.

In addition to investigating its effects on the common cold, researchers have studied echinacea's possible benefits for upper respiratory infections. The National Institutes of Health's National Center for Complementary and Alternative Medicine stated that research in this area was promising enough that they sponsored ongoing clinical trials of echinacea to treat upper respiratory infections. Research is also being done on the effects of echinacea on the gastrointestinal tract and its possible use to help protect the immune system during **cancer** treatment with chemotherapy.

Preparations

Decoction is the best method to extract the mineral salts and other healing components from the

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coarser herb materials, such as the root, bark, and stems. It is prepared by adding 1 oz (28 g) of the dried plant materials, or 2 oz (56 g) of fresh plant parts, to one pint of pure, chlorine-free, boiled water in a non-metallic pot. The mixture is simmered for about one half hour, then strained and covered. A decoction may be refrigerated for up to two days and retain its healing qualities.

An infusion is the method used to derive benefits from the leaves, flowers, and stems in the form of an herbal tea. Twice as much fresh, chopped herb as dried herb should be used. It is steeped in one pint of boiled, chlorine-free water for 10–15 minutes. Next, it is strained and covered. The infusion is drunk warm and sweetened with honey if desired. A standard dose is three cups per day. An infusion will keep for up to two days in the refrigerator and retain its healing qualities.

A tincture is the usual method for preparing a concentrated form of the herbal remedy. Tinctures, properly prepared and stored, will retain medicinal potency for two years or more. Combine 4 oz (113 g) of finely cut fresh or powdered dry herb with one pint of brandy, gin, or vodka, in a glass container. The alcohol should be enough to cover the plant parts and have a 50/50 ratio of alcohol to water. The mixture should be placed away from light for about two weeks and shaken several times each day. It should be strained and stored in a tightly capped, dark glass bottle. A standard dose is 4 ml of the tincture three times a day.

Precautions

Echinacea is considered safe in recommended doses. Women who are pregnant or breastfeeding are generally advised not to take echinacea in injection form. Because the plant has proven immuno-modulating properties, individuals with systemic lupus erythmatosus, **rheumatoid arthritis, tuberculosis, leukemia, multiple sclerosis,** or **AIDS** should consult their physician before using echinacea. Echinacea should not be given to children under two years of age, and it should only be given to children over two in consultation with a physician. Research indicates that echinacea is most effective when taken at first onset of symptoms of cold or flu and when usage is continued no longer than eight weeks. There is some indication that the herb loses its effectiveness when used over a long period of time. Echinacea is believed to be more effective when use is discontinued for a period after every eight weeks of use.

Studies investigating the active ingredients in echinacea preparations available commercially have found widely varying potencies. In many cases the amount and type of echinacea contained in the product was not that specified on the label. One study even found that 10% of brands investigated contained no echinacea at all. Individuals should be sure to obtain echinacea from a trusted, reputable brand, preferably one that guarantees the amount, type, and potency of the echinacea contained in it.

KEY TERMS

Alterative—A medicinal substance that acts gradually to nourish and improve the system.

Antimicrobial—A plant substance that acts to inhibit the growth of harmful microorganisms or acts to destroy them.

Febrifuge—A plant substance that acts to prevent or reduce fever.

Glycoside—An herbal carbohydrate that exerts powerful effect on hormone-producing tissues. The glycoside breaks down into a sugar and a non-sugar component.

Lanceolate—Narrow, leaf shape that is longer than it is wide and pointed at the end.

Macrophage—Specialized cells present throughout the lymphoid tissues of the body that circulate in the bloodstream. Macrophages have a surface marker that stimulates other cells to react to an antigen.

Side effects

Most people experience no side effects when taking echinacea at recommended dosage levels. Some instances of side-effects have been reported however, including rash, temporary numbing of the tongue, and gastrointestinal problems. Echinacea may cause allergic reaction in some people. It is believed to be more likely to cause an allergic reaction in individuals who are allergic to other members of the daisy family, including daisies, marigolds, chrysanthemums, and ragweed. Individuals who have **asthma** may also be at increased risk.

Interactions

Individuals taking drugs that suppress the immune system should check with their doctor before taking echinacea. It is believed that echinacea might interact with immunosuppressant drugs, making them less effective.

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ORGANIZATIONS

American Botanical Council, 6200 Manor Rd., Austin, TX 78723, (512) 926-4900, http://abc.herbalgram.org.

National Center for Complementary and Alternative Medicine at the National Institutes of Health, 9000 Rockville Pike, Bethesda, MD 20892, (888) 644-6226, http://nccam.nih.gov.

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Eczema

Definition

Eczema, also called atopic **dermatitis** (AD), is a noncontagious inflammation of the skin that is characteristically very dry and itchy. The condition is frequently related to some form of allergy, which may include foods or inhalants.

Description

Atopic dermatitis is sometimes described as "the itch that rashes"—the scratching of the irritated areas may very well initiate the rash in some patients. The skin of those affected by AD is abnormally dry because of excessive loss of moisture. Chronic or severe cases of it can cause the affected areas to form thick plaques (patches of slightly raised skin), develop serous (watery) exudates, or become infected.

The areas of the body that are affected by AD tend to vary with age. Children under five years old most commonly have AD, but it can occur at any age. It can be mild and intermittent, or severe and chronic. Infants frequently experience it on the face and other areas of the head. They frequently rub their heads with their hands or on the crib bedding. The stomach and limbs may also become involved. Older children commonly have the worst spots on flexor surfaces, namely the inner wrists and elbows, backs of knees, and tops of ankles. The hands and feet are other common sites. The knees, elbows, hands, and feet may continue to be a problem into adulthood.

KEY TERMS

Atopy—A group of diseases, including eczema, that develop in people with an inherited tendency to develop immediate antibodies to common environmental allergens.

Corticosteroids—A group of synthetic hormones that are used to prevent or reduce inflammation. Toxic effects may result from rapid withdrawal after prolonged use or from continued use of large doses.

Dermatitis—An irritation or imflammation of the skin.

Nummular dermatitis—A skin infection in which the areas of irritated skin are coin-shaped.

Causes and symptoms

Genetic predisposition plays a large role in who will get AD or other **allergies**. The condition is not contagious. A child who has one parent with some form of allergic, or atopic, disease has somewhere between a 25–60% chance of also experiencing allergies, whether AD or some other form. There is approximately a 50–80% chance that a child of two parents with allergies will also develop some form of atopy. The genetic predisposition of the individual, combined with such factors such as early exposure to strong antigens, will determine whether and to what extent that person will develop allergies. Aside from a predisposition to eczema, increased use of soapy detergents and baby wipes is probably responsible for higher incidence of childhood eczema as well.

The hallmark sign of AD is a red, itchy rash. The age of the patient determines what regions are most likely affected, but exceptions do occur.

Diagnosis

No laboratory test can reliably diagnose AD, although some patients will be reactive to tests

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designed to diagnose allergy. These would include skin tests by intradermal injection, scratch, or patch tests. There is also a blood test available that measures levels of antibodies to suspected allergens. Diagnosis is generally made by the appearance and location of the rash. A personal or family history of allergy of any type, including food allergy, **asthma**, or **hay fever** also supports the diagnosis of AD.

Other types of dermatitis that may be described as eczematous include **contact dermatitis**, nummular dermatitis, and stasis dermatitis. The stasis type is related to poor circulation, which may also be a factor in nummular dermatitis. These forms generally occur in older adults, whereas AD is primarily a disease of children. Contact dermatitis can occur at any age. It results from skin contact with either an irritant or an allergen. The area affected is limited to the area in contact with the offending substance.

Treatment

The basis of treatment for AD is keeping the skin moist and clean, as well as avoiding irritants and known allergens as much as possible. Further measures become necessary if the case is particularly severe, or if the skin becomes infected.

Conventional wisdom has been that minimal bathing of the patient with AD is ideal. The rationale was that bathing would break down the natural oil barrier of the skin and cause further drying. It actually appears now that frequent long, tepid soaks are beneficial to hydrate the very dry skin that this condition produces. Adding a muslin bag filled with milled oats or the commercially available preparation Aveeno bath to the water can be soothing. The bath water should cover as much of the skin as possible. Wet towels may be draped around the shoulders, upper trunk, and arms if they are above the water level. The face should be dabbed frequently during bathing to keep it moist. The use of soap should be minimized, and limited to very mild agents such as Cetaphil. The bath must be followed within two or three minutes by a gentle patting dry, and a thick application of a water barrier ointment, such as Aquaphor, Unibase, or Vaseline. Lotions are not generally recommended as they almost universally contain alcohol, which is drying and may burn when applied. Soaking in plain water can be painful during severe episodes of AD. Adding one-half cup of table salt to one-half tub of water creates a normal saline solution, similar to what is naturally present in the tissues, and may relieve the burning. Commercial Domeboro powder may also be helpful.

One alternative to bathing is to use soaking wraps. For this method, cotton towels or other cloths are soaked in tepid water, with table salt or Domeboro powder added for comfort if desired. The patient's bed is covered with something waterproof, and the bare skin is covered as thoroughly as possible with the wet wrappings. The body should then be covered by a waterproof covering to slow evaporation. Vinyl sheeting and plastic wrap are two alternatives. The wraps should be left in place for as long as possible, but at least for 30 minutes, before the water barrier and any topical medications are applied.

Environmental improvement affords some relief for many patients. Pet dander and cigarette smoke are potential aggravating factors. Keeping these out of the home is probably for the best, but at minimum, they should not be allowed in the room of the allergic person. Clothing and bedding should be 100% soft cotton, and laundered in detergent with no perfumes. These items should also be washed before the initial use in order to rid them of potentially irritating residues. Clothes should fit loosely to prevent irritation from rubbing. Washing bedding in hot water will help to kill dust mites. Running laundry through a double rinse cycle will help to remove any vestiges of detergent. Avoiding the use of fabric softener or dryer sheets helps, as these are frequently scented and may be irritating. Drying clothes or bedding outdoors should be avoided, because pollen and other potential allergens are likely to cling to them. Mattresses and pillowcase can be covered by special casings that are impervious to the microscopic dust mites that infest them. Under normal circumstances, these mites cause no problem, but they can be a major irritant for the individual with asthma or AD.

Temperature extremes can make AD worse, so heating and cooling should be employed as appropriate, along with adding humidity if needed. Patients tend to have abnormal regulation of body temperature, and sometimes feel warmer or colder than other people in similar circumstances. Sweating will frequently aggravate AD. Room temperature should be adjusted for comfort. Central air conditioning is the best option for cooling the home. Evaporative cooling brings a large amount of potential irritants into the house, as do open windows. Air conditioning rather than open windows should also be used to cool the car. Electrostatic filters and vent covers are available to remove irritants from the air in the house. These should be frequently changed or cleaned as recommended by the manufacturer.

In the patient's room, dust-collecting items such as curtains, carpeting, and stuffed animals are best

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minimized. Vacuuming and dusting should be done regularly when the affected person is not in the room. A HEPA filter unit, and a vacuum with a built-in HEPA filter remove a high percentage of dust and pollen from the environment.

Some simple mechanical measures will reduce the amount of skin damage done by scratching. It is important to keep fingernails short. Using a nail file will produce a smoother nail edge than scissors or clippers. It is particularly difficult to keep children from scratching irritated and itchy skin, but using pajamas and clothing with maximum skin coverage will help to protect the bare skin from fingernails. Mittens or socks may be used to cover the hands at night to reduce the effects of scratching. Infant gowns with hand coverings are useful for the very young patient.

In addition to the skin care and environmental measures to relieve eczema, there are some complementary therapies that may prove helpful.

Acupuncture

Any type of therapy that relieves **stress** can also help to manage AD. Acupuncturists also claim to be able to treat blood and energy deficiencies, and to counteract the effects of detrimental elements, including heat, dampness, and wind.

Autogenic training

Autogenic training is similar to methods of **meditation** and self-hypnosis. Instructors help the patient to achieve and maintain a relaxed state of positive concentration. This is eventually done independently. Even ten minutes of practice per day can produce beneficial results for mind and body. Research has shown AD to be one of the conditions that is improved by this technique.

Aromatherapy/massage

Massage is another therapy that can be effective in reducing stress. The oils that are used in the treatment can also make a difference in AD. Some patients get relief from the topical use of **evening primrose oil** (EPO) diluted in carrier oil. Aromatherapists may use small amounts of **essential oils** from **lavender**, bergamot, and geranium. These are promoted to decrease both **itching** and inflammation. Improper dilutions, however, can worsen the condition.

Herbal therapy

Some herbal therapies can be useful for skin conditions. Among the herbs most often recommended are:

- Calendula (*Calendula officinalis*) ointment, for anti-inflammatory and antiseptic properties.
- Chickweed (*Stellaria media*) ointment, to soothe itching.
- Evening primrose oil (*Oenograceae*) topically to relieve itching, and internally to supplement fatty acids.
- German chamomile (*Chamomilla recutita*) ointment, for anti-inflammatory properties.
- Nettle (*Urtica dioica*) ointment, to relieve itching.
- Peppermint (*Menta piperita*) lotion, for antibacterial and antiseptic properties.
- Chinese herbal medicine. In traditional Chinese medicine, there are formulas used to treat eczema that nourish the blood, moisten the skin, stop itching, and encourage healing. Some formulas are used topically and others taken internally.

There is individual variation in the effectiveness of the topical treatments. Some experimentation may help to find the combination that most benefits an individual. When the condition is chronic, severe, or infected, guidance from a health care professional should be sought before attempting self-treatment.

Hypnotherapy

Hypnotherapy has the potential to improve AD through using the power of suggestion to reduce itching. Since mechanical damage to the skin done by scratching may irritate, or actually cause, the rash, any measure that reduces scratching can prove helpful.

Nutritional supplements

There are several nutrients that can prove helpful for treating AD. Oral doses of EPO, which contains gamma-linolenic acid, have been shown to significantly reduce itching. The amount used in studies was approximately 6 g of EPO per day. **Fish oil** has also been shown to improve AD, at an approximate dose of 1.8 g per day. **Vitamin C** can affect both skin healing and boost the immune system. Doses of 50–75 mg per kilogram of body weight have been proven to relieve symptoms of AD. Additional **copper** may be required in supplemental form when high doses of vitamin C are taken. **Vitamin E** is reportedly useful, but there are no documented studies of its benefits.

Reflexology

The areas of the foot that receive attention from a reflexologist when a patient has AD include the ones relating to the affected areas of the body, as well as

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those for the solar plexus, adrenal glands, pituitary gland, liver, kidneys, gastrointestinal tract, and reproductive glands.

Allopathic treatment

Allopathic treatment involves use of oral antihistamines to decrease itching, topical water barriers, mild topical corticosteroids when indicated, and topical antibiotics if needed. The water barrier should be applied generously; the corticosteroids and antibiotics used sparingly, and only on areas where indicated. The person applying the topical medications can wear gloves to minimize exposure to the steroids and antibiotics. Oral antibiotics may also be used when widespread infection is present. On rare occasions, oral corticosteroids are prescribed to reduce severe itching and inflammation, but this course is best avoided due to its potential side effects. In 2001, the U.S. Food and Drug Administration (FDA) approved a new nonsteroid prescription cream for patients age two and older called Elidel.

Expected results

There is no cure for AD, although most patients will experience improvement with age. Perhaps half of children will have no further trouble past the age of five years. However, as many as 75% of those who have AD in childhood will go on to have other allergic manifestations such as asthma, food allergies, and hay fever. Diligent daily care of the skin and avoidance of known triggers will control most cases of AD to a large extent.

Prevention

One of the best things a mother can do to help keep her child from getting AD is to breastfeed. It is best for the baby to have breast milk exclusively for at least six months, particularly when there is a family history of AD or other types of allergy. There also appears to be an advantage to the breastfeeding mother avoiding foods known to be commonly allergenic, particularly if there is a family history. This would include wheat, eggs, products made from cow's milk, peanuts, and fish. If breastfeeding is not possible, a hypoallergenic formula should be used if there is family history of allergy. Consult a health care provider for help with determining the best type.

The patient already diagnosed with AD can minimize flare-ups by avoiding known triggers and following the skin care program outlined above. It is important to continue to follow guidelines for a daily emollient routine (moistening skin twice daily) even when skin is under control to prevent flare-ups. Eczematous skin is also more susceptible to **infections**. Patients should try to stay away from people with chicken pox, cold sores, and other contagious skin infections.

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Edema

Definition

Edema is a condition of abnormally large fluid volume in the circulatory system or in tissues between the body's cells (interstitial spaces).

Description

Normally the body maintains a balance of fluid in tissues by ensuring that the same amount of water entering the body also leaves it. The circulatory system transports fluid within the body via its network of blood vessels. The fluid, which contains oxygen and nutrients needed by the cells, moves from the walls of the blood vessels into the body's tissues. After its

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nutrients are used up, fluid moves back into the blood vessels and returns to the heart. The lymphatic system (a network of channels in the body that carry lymph, a colorless fluid containing white blood cells to fight infection) also absorbs and transports this fluid. In edema, either too much fluid moves from the blood vessels into the tissues, or not enough fluid moves from the tissues back into the blood vessels. This fluid imbalance can cause mild to severe swelling in one or more parts of the body.

Causes and symptoms

Many ordinary factors can upset the balance of fluid in the body to cause edema, including:

- Immobility. The leg muscles normally contract and compress blood vessels to promote blood flow with walking or running. When these muscles are not used, blood can collect in the veins, making it difficult for fluid to move from tissues back into the vessels.
- Heat. Warm temperatures cause the blood vessels to expand, making it easier for fluid to cross into surrounding tissues. High humidity also aggravates this situation.
- Medications. Certain drugs, such as steroids, hormone replacements, nonsteroidal anti-inflammatory drugs (NSAIDs), and some blood pressure medications may affect how fast fluid leaves blood vessels.
- Intake of salty foods. The body needs a constant concentration of salt in its tissues. When excess salt is taken in, the body dilutes it by retaining fluid.
- Menstruation and pregnancy. The changing levels of hormones affect the rate at which fluid enters and leaves the tissues.

Some medical conditions may also cause edema, including:

- Heart failure. When the heart is unable to maintain adequate blood flow throughout the circulatory system, the excess fluid pressure within the blood vessels can cause shifts into the interstitial spaces. Left-sided heart failure can cause pulmonary edema, as fluid shifts into the lungs. The patient may develop rapid, shallow respirations, shortness of breath, and a cough. Right-sided heart failure can cause pitting edema, a swelling in the tissue under the skin of the lower legs and feet. Pressing this tissue with a finger tip leads to a noticeable momentary indentation.
- Kidney disease. The decrease in sodium and water excretion can result in fluid retention and overload.
- Thyroid or liver disease. These conditions can change the concentration of protein in the blood, affecting fluid movement in and out of the tissues. In advanced liver disease, the liver is enlarged and fluid may build up in the abdomen.
- Malnutrition. Protein levels are decreased in the blood, and in an effort to maintain a balance of concentrations, fluid shifts out of the vessels and causes edema in tissue spaces.

Some conditions that may cause swelling in just one leg include:

- Blood clots. Clots can cause pooling of fluid and may be accompanied by discoloration and pain. In some instances, clots may cause no pain.
- Weakened veins. Varicose veins, or veins whose walls or valves are weak, can allow blood to pool in the legs. This is a common condition.
- Infection and inflammation. Infection in leg tissues can cause inflammation and increasing blood flow to the area. Inflammatory diseases, such as gout or arthritis, can also result in swelling.
- Lymphedema. Blocked lymph channels may be caused by infection, scar tissue, or hereditary conditions. Lymph that can not drain properly results in edema. Lymphedema may also occur after cancer treatments, when the lymph system is impaired by surgery, radiation, or chemotherapy.
- Tumor. Abnormal masses can compress leg vessels and lymph channels, affecting the rate of fluid movement.

Symptoms vary depending on the cause of edema. In general, weight gain, puffy eyelids, and swelling of the legs may occur as a result of excess fluid volume. Pulse rate and blood pressure may be elevated. Hand and neck veins may be observed as fuller.

KEY TERMS

Digitalis—A naturally occurring compound used in the preparation of the medication digoxin, prescribed to increase the heart rate and strengthen the force of the heart's contractions.

Diuretics—Medications used in the treatment of fluid overload to promote excretion of sodium and water.

Interstitial spaces—Areas of the body occurring outside the vessels or organs, between the cells.

Pitting edema—A swelling in the tissue under the skin, resulting from fluid accumulation, that is measured by the depth of indentation made by finger pressure over a boney prominence.

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Diagnosis

Edema is a sign of an underlying problem, rather than a disease unto itself. A diagnostic explanation should be sought. Patient history and presenting symptoms, along with laboratory blood studies, if indicated, assist the health professional in determining the cause of the edema.

Treatment

Simple steps to lessen fluid build-up may include:

- reducing sodium intake
- maintaining proper weight
- exercise
- elevation of the legs
- use of support stockings
- massage
- travel breaks

Nutritional therapy

A naturopath or a nutritionist may recommend the following dietary changes:

- Reduction of salt intake, including salty foods such as olives, soy sauce, or pickles. Cutting back the amount of sodium eaten may help reduce edema.
- Limited use of alcohol, caffeine, sugar, and dairy products.
- Increased consumption of whole grain foods, cucumbers, apples, potatoes, grapes, onions, cabbage, and oranges.
- Daily vitamin and mineral supplements.

Herbal therapy

Diuretic herbs can also help relieve edema. One of the best herbs for this purpose is **dandelion** (*Taraxacum mongolicum*), since, in addition to its diuretic action, it is a rich source of **potassium**. (Diuretics flush potassium from the body, and it must be replaced to avoid potassium deficiency.)

Hydrotherapy

Hydrotherapy using daily contrast applications of hot and cold (either compresses or immersion) may also be helpful.

Other alternative treatments

Other alternative therapies may also reduce edema. They include **traditional Chinese medicine**, Ayurveda, juice therapy, and bodywork. Traditional Chinese medicine and **acupuncture** have an elaborate diagnostic system to determine the pattern causing the edema. Thus treatment, if done correctly, results not only in the removal of fluid, but also with the correction of the problem.

Allopathic treatment

The three "Ds"—diuretics, **digitalis**, and diet—are frequently prescribed for medical conditions that result in excess fluid volume. Diuretics are medications that promote urination of **sodium** and water. Digoxin is a digitalis preparation that is sometimes needed to decrease heart rate and increase the strength of the heart's contractions. One dietary recommendation includes less sodium in order to decrease fluid retention. Consideration of adequate protein intake is also made.

For patients with lymphedema, a combination of therapies may prove effective. Combined decongestive therapy includes the use of manual lymph drainage (MLD), compression bandaging, garments and pumps, and physical therapy.

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ORGANIZATIONS

Lymphedema and Wound Care Clinic of Austin. 5750 Balcones Dr., Ste. 110, Austin, TX 78731. (512) 453-1930. http://www.lymphedema.com.

Mai Tran

Elder

Description

Gaining popularity in modern times as a cold and flu medicine, elder flower has been an important folk remedy for centuries. The Roman naturalist Pliny wrote about the therapeutic value of this flowering tree in the first century A.D. Native Americans used elder as a treatment for respiratory **infections** and **constipation** as well as an herbal pad for healing **wounds**. Black elder (*Sambucus nigra*) is the most popular variety of the plant, though there are other species known to have similar chemical ingredients. Elder grows in Europe, Asia, North Africa, and the

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Elderflowers. *(©PlantaPhile, Germany. Reproduced by permission.)*

United States. Most medicinal elder is obtained from the former Soviet Union, Eastern Europe, and the United Kingdom. The Latin word *sambucus* is thought to be derived from the Greek *sambuca*, which refers to a stringed musical instrument popular among the Ancient Romans. In fact, some modern day Italians still make a primitive pipe called a *sampogna* from the branches of the tree, which also produces fragrant, cream-colored flowers and deep-violet berries. The flowers and berries are used most often in the drug of commerce, though the leaves, bark, and roots are also considered to have therapeutic effects. The berries traditionally have been used to make elderberry wine as well as pies and jellies, although no value has yet been found in these products.

The German Commission E, considered an authoritative source of information on alternative remedies, determined that elder has the ability to increase bronchial secretions as well as perspiration. These properties can be useful in helping to alleviate symptoms of the **common cold** or the flu. Even more interesting is the possibility that elder, like another herbal remedy called **echinacea**, may have the power to shorten the duration of colds by up to a few days. While it is not known exactly how elder produces its therapeutic effects, study has focused on several naturally occurring chemicals in the plant. Elder's flavonoids and phenolic acids are thought to be responsible for its ability to increase perspiration. The triterpenes in elder may also be potential active ingredients, though more study is required to confirm this. The remaining chemical constituents of medicinal elder usually include **potassium** and other minerals; sterols; volatile oils containing linoleic, linolenic, and palmitic acid; mucilage; pectin; protein; sugar; and tannins.

A number of other properties have been ascribed to elder as well, including anti-inflammatory, diuretic, antiviral, and antispasmodic activities. A 1997 study published in the *Journal of Ethnopharmacology*, which studied black elder in the test tube, indicates that the herb has some activity as an anti-inflammatory. While this may help to partially explain elder's success in treating colds, it also suggests that the herb may have potential as a treatment for inflammatory diseases such as rheumatism. Elder has also been described in the history of folk medicine as a laxative and a sedative.

General use

While not approved by the U.S. Food and Drug Administration (FDA), black elder flower is primarily used in the United States and Europe for colds and the flu. When taken internally, elder flower is approved by the Commission E for colds. In Germany, elder flower tea is licensed by the government to treat the common cold and other upper respiratory problems. By increasing bronchial secretions as well as perspiration, elder is believed to help ease symptoms such as **cough** and **fever** and may even shorten a cold's duration. In the United States and Canada, elder is often combined with **peppermint** leaf and **yarrow** flower in preparations intended to alleviate cold-related fever.

In a study published in the *Journal of Alternative and Complementary Medicine* in 1995, use of a standardized elderberry extract shortened the duration of the flu by about three days. The placebo-controlled, double-blind study involved the residents of an Israeli kibbutz. "A significant improvement of the symptoms, including fever, was seen in 93.3% of the cases in the SAM-treated group [elder-treated group] within 2 days," the researchers reported, "whereas in the control group 91.7% of the patients showed an improvement within 6 days." About 90% of the people treated with elder were considered flu-free in two to three days, while the majority of patients in the

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KEY TERMS

Antispasmodic—An agent with the ability to prevent or relieve convulsions or muscle spasms.

Diuretic—An agent that increases the production of urine.

Echinacea—A popular herbal remedy used to treat colds, the flu, and urinary tract infections.

Edema—Abnormal swelling of tissue due to fluid buildup. Edema, which typically occurs in the legs, liver, and lungs, is often a complication of heart or kidney problems.

placebo group only got well after about 6 days. The authors of the study recommended elder as a possible treatment for **influenza** A and B based on the herbal remedy's effectiveness, lack of side effects, and low cost. By way of comparison, over-the-counter synthetic drugs may offer some measure of symptomatic relief for a cold but have not been proven to actually speed recovery. Elder is also being investigated as a treatment for other viral infections such as human immunodeficiency virus (HIV) and herpes.

Throughout its long history, elder has been used to treat a variety of other diseases and medical problems. These include liver disease, kidney disorders, rheumatism, **insomnia**, toothaches, **measles**, **asthma**, **cancer**, chafing, **epilepsy**, **gout**, headaches, **neuralgia**, **psoriasis**, **syphilis**, and **laryngitis**. It has also been used topically as an herbal pad to reduce external swelling and heal wounds. Some women have used elder to increase the amount of milk produced during breastfeeding. However, sufficient scientific evidence to support these additional uses is lacking. While elder has been used as a folk remedy for treating diabetes, studies in rodents suggest that it has no effects on blood sugar regulation.

Preparations

Dosage of elder generally ranges from 10-15 g per day, divided into three equal doses. The drug, which is recommended for internal use only, is usually taken as a tea or liquid extract. Elder tea can be prepared by steeping 3-4 g (2 teaspoonfuls) of dried elder flower in 150 ml of hot (not boiling) water. The mixture should be strained after about 5 minutes. The tea works best when it is consumed at a temperature as hot as can be safely tolerated. Dosage is several cups of tea a day (do not exceed the daily maximum of 15 g of elder), taken in the afternoons and evenings. When using a standardized liquid extract of elder, follow the package directions for proper use.

Precautions

Taken in recommended dosages, elder is not known to be harmful. It should be used with caution in children, women who are pregnant or breastfeeding, and people with kidney or liver disorders because its effects in these groups has not been sufficiently studied.

Be careful not to confuse black elder with a more toxic species of the plant called dwarf elder (*Sambucus ebulus*). Dwarf elder is generally not recommended for medical purposes and may cause **vomiting** and **diarrhea** in large dosages.

Side effects

Side effects are considered rare. Mild abdominal distress or allergic reactions may occur.

Interactions

Elder is not known to interact adversely with other medications or herbal remedies. Preparations that combine elder with yarrow flower and peppermint leaf have been used without apparent harm.

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Herb Research Foundation. 1007 Pearl Street, Suite 200, Boulder, CO 80302.

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OnHealth. http://www.onhealth.com.
Discovery Health. http://www.discoveryhealth.com.

Greg Annussek

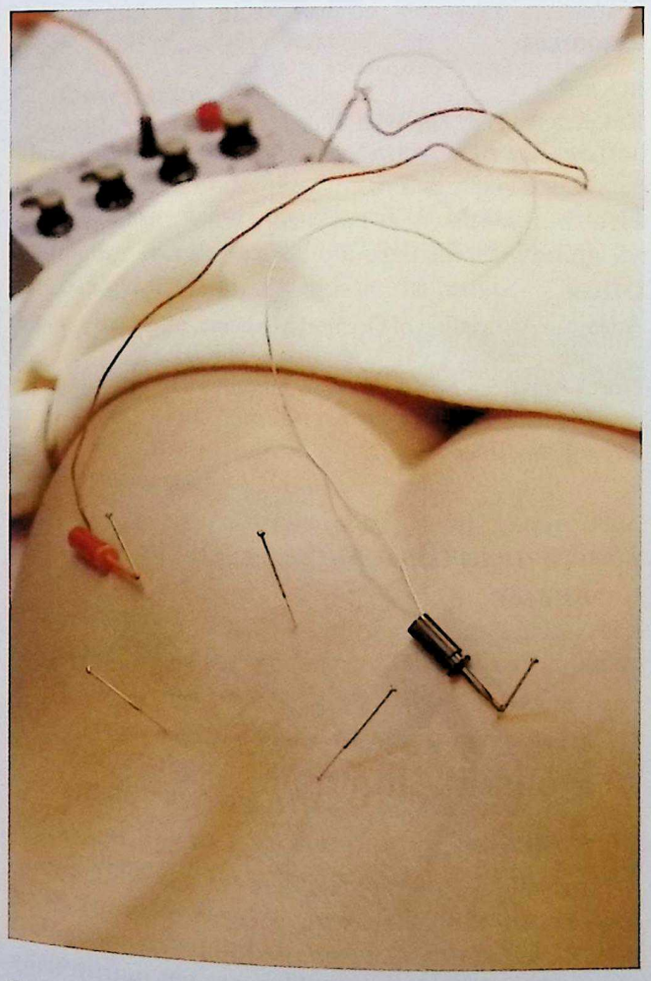
Electroacupuncture

Definition

Electroacupuncture is an **acupuncture** technique that applies small electrical currents to needles that have been inserted at specific points on the body.

Origins

Acupuncture originated thousands of years ago in China as a healing technique. Electroacupuncture was developed in 1958 in China, when acupuncturists there began experimenting with it as surgical anesthesia, or **pain** control. After several years of testing during surgery, acupuncturists began applying electroacupuncture in clinical practice for many conditions.



Electroacupuncture. *(© Peter Banos / Alamy)*

KEY TERMS

Anesthesia—Method of controlling pain during surgery.

Epilepsy—Condition characterized by sudden seizures and other symptoms.

Pacemaker—Device that is surgically implanted in patients with heart disease or disorders, that regulates the beating of the heart.

Benefits

Electroacupuncture can be used to treat the same variety of health conditions that regular acupuncture treats, and for conditions that do not respond to conventional acupuncture. It is effectively used as surgical anesthesia, as a means of reducing chronic pain and **muscle spasms**, and as a treatment for neurological (nerve) disorders.

Description

Acupuncturists begin treatment by diagnosing a patient. Diagnosis is performed with interviews, close examinations (such as of the tongue and **pulse diagnosis**), and other methods. Acupuncture strives to balance and improve the flow of *chi*, or life energy, which travels throughout the body in channels called *meridians*. According to **traditional Chinese medicine** (TCM), illness is caused when chi does not move properly in the body. Acupuncturists are trained to determine where chi is stagnated, weak, or out of balance, which indicates where and how acupuncture points on the body should be stimulated. Electroacupuncture is often recommended for cases of accumulation of chi, such as in chronic pain, and in cases where the chi is difficult to prompt or stimulate.

Patients usually lie down for acupuncture treatment. Thin, sterilized needles are used, and the surface of the skin where they will be inserted is sterilized, as well. One advantage of electroacupuncture is that the margin of error for needle placement is greater than for regular acupuncture, because the electrical current stimulates a larger area around the needle. Electroacupuncture works with two needles at a time, in order for electrical current to pass through the body from one needle to another. Small devices are used to create and regulate a pulsing electric charge, which is

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REINHOLD VOLL (1909-1989)

German physician Reinhold Voll initially studied architecture in school and had no intention to become a physician. He decided to study medicine when various treatments to restore the health of his father failed. He spent much of his early career specializing in tropical diseases, sports medicine, and public health, and set up a practice in Plochingen in southern Germany. He was introduced to methods of Chinese acupuncture by a doctor who worked in the tropics and was a firm believer in the practice. By the 1950s, Voll was engaging in the ancient Chinese practice. He had an idea that modern technology might enhance acupuncture in the treatment of various chronic diseases such as allergies, chronic fatigue, migraines, and chronic liver, kidney or pancreatic diseases. His research led him to electroacupuncture (EAV), using electric currents to enhance manipulation of the traditional acupuncture points. In addition to that, he realized there were even more points, or meridians, that corresponded directly with particular organs. Voll then developed a system to measure the degree of inflammation these organs suffered.

Voll focused on certain criteria by which to treat these points. He determined that conditions were either inflammable, chronic, or subchronic. By the use of nosodes, remedies composed of bacteria or viruses, and based on the causes of those diseases and using other homeopathic agents, he was able to test for drugs before the patient ingested them. It was Voll who also discovered the relationship between teeth and the inner organs, an important key to understanding health and disease.

The Institute for ElectroAcupuncture & ElectroDiagnostics is based on Voll's original methods and is located in Munich, Germany. The website for additional information can be located at: http://www.eavnet.com.

sent to the needles by attaching small clips to their ends. The electric charge is very small, and can be adjusted by the acupuncturist or patient. Both the voltage (intensity) and the frequency of the electric charge can be adjusted for healing effects. Voltage levels should be raised slowly. Several pairs of needles may be stimulated at one time, for up to 30 or more minutes of electrical stimulation along the meridians. Another similar, though conventional, medical technique is called transcutaneous electrical nerve stimulation (TENS), which uses electrodes that are taped to the surface of the skin instead of attached to inserted needles, which may be advantageous for patients for whom needles pose risks or problems. This technique stimulates along nerve and muscle groups.

Precautions

Electroacupuncture should not be used on people who have seizures, **epilepsy**, histories of **heart disease** or strokes, or on those with heart pacemakers. Electroacupuncture should not be performed on the head, throat, or directly over the heart, and should be performed with care on spastic muscles. Another recommended precaution is that electrical current should not be sent across the midline of the body, which is the line running from the nose to the navel.

Side effects

During electroacupuncture, patients report sensations of tingling, warmth, and mild aches. Bruising and bleeding may occur, as the needles may hit small blood vessels.

Resources

BOOKS

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OTHER

American Association of Oriental Medicine. http://www.aaom.org.

North American Society of Acupuncture and Alternative Medicine. http://www.nasa-altmed.com.

Douglas Dupler

Eleutherococcus senticosus see **Ginseng, Siberian**

Elimination diet

Definition

An elimination diet functions as a test, determining whether patients may have a sensitivity to certain foods. Elimination diets are used to detect food **allergies** and food intolerances. They are not nutritionally balanced and are intended to be used only for

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diagnostic purposes. Initially, patients stop eating foods suspected of causing illness. Then, after a suitable period of time (often 10–14 days), they review their symptoms. If significant improvement has occurred, it is assumed that an allergy or intolerance to certain foods may be involved. These suspect foods are then reintroduced to the diet, one by one. When symptoms return (usually within three days), the problematic food is identified and removed from the diet.

Benefits

Elimination diets are potentially useful in identifying hard-to-detect food intolerances that proponents believe are responsible for a wide range of ailments, including **constipation**; headaches or migraine; **infections** of the ear or sinuses; frequent colds, post nasal drip, chronic nasal congestion, sore throats or chronic **cough**; **eczema**, **hives**, or **acne**; **asthma**; **pain** or stiffness in the muscles or joints; heart palpitations; **indigestion**; ulcers of the mouth, stomach, or duodenum; **Crohn's disease**; **diarrhea**; yeast infections; urticaria; **edema**; **depression** or **anxiety**; hyperactivity; weight change; and generalized **fatigue**.

Description

A true elimination diet is very rigorous and needs to be implemented under the direction of a physician often in consultation with a dietitian or nutritionist. For the elimination diet to be useful, the patient must follow the diet strictly. Cheating invalidates the results.

For two to three weeks, a person on the elimination diet eats absolutely none of the following foods (this list may be modified by the physician):

- Additives: monosodium glutamate, artificial preservatives, sweeteners, flavors, or colors
- Alcohol: beer, ale, stout, porter, malt liquors, wine, coolers, vodka, gin, rum, whiskey, brandy, liqueurs, and cordials
- Citrus fruits: oranges, calamondins, tangerines, clementines, tangelos, satsumas, owaris, lemons, limes, kumquats, limequats, and grapefruit
- Commonly eaten foods: anything consumed more than three times weekly, as well as foods that are craved or that cause a feeling of weakness
- Corn: as well as corn syrup or sweetener, corn oil, vegetable oil, popcorn, corn chips, corn tortillas
- Dairy products: milk, milk solids, cheese, butter, sour cream, yogurt, cottage cheese, whey, and ice cream
- Eggs: both yolks and whites
- Gluten: any pasta, breads, cakes, flour, or gravies containing wheat
- Honey
- Maple syrup
- Sugar: candy, soft drinks, fruit juices with added sugar or sweetener, cakes, cookies, sucrose, fructose, dextrose, or maltose

Foods that may be allowed include:

- Cereals: puffed rice or millet, oatmeal, or oat bran
- Daily multivitamin: this is especially important during extended dieting, to replace missing nutrients
- Fats and oils: soy, soy milk, soy cheese, sunflower oil, safflower oil, flaxseed oil, olive oil, and sesame oil
- Fruits and vegetables: typically, anything except corn and citrus fruits. Some practitioners suggest fruit be consumed in moderation and preferably whole as opposed to juices.
- Grain and flour products: rice cakes or crackers, rye or spelt bread (both must be 100% with no added wheat), kasha, rice, amaranth, quinoa, millet, oriental noodles, other exotic grains
- Legumes: soybeans, string beans, black beans, navy beans, kidney beans, peas, chickpeas, lentils, tofu. Canned beans should be avoided unless they are free of preservatives and sugar.
- Seeds and nuts: must not contain sugar or salt. Nut butters are allowed if they meet this requirement and are organic.
- Water: two quarts daily. Preferably bottled, as tap water contains potential allergens, including fluoride and chlorine.
- Other: white vinegar, salt, pepper, garlic, onions, ginger, herbal teas, coffee substitutes, spices or condiments (mustard, ketchup) that are free from sugar, preservatives, and citrus. These products can commonly be found at health food stores.

The individual must avoid all medicines containing aspirin (salicylates) and food colorings. After several weeks on these restricted foods, one new food is introduced in larger than normal amounts. This is the challenge food, and it is eaten for three days in a row. If no symptoms appear, the dieter continues to eat that food in normal amounts and adds another challenge food. If symptoms appear, the challenge food is stopped immediately and no new challenge food is introduced until symptoms disappear. During this time the dieter keeps a food journal, writing down everything that is eaten and any symptoms, either physical or emotional, that appear. It can take two to three months to work through all challenge foods.

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Precautions

As with all therapies, anyone considering an elimination diet should consider the potential benefits against the risks. The decision, according to some, is comparable to deciding to take a prescribed medication and should be done only under the supervision of a competent medical practitioner.

Anyone suspected of having a moderate to severe food allergy should be under the care of a physician. Any food challenging must be done in a healthcare setting, as severe reactions can cause anaphylactic shock and death.

A serious risk of self-administered elimination diets is that people who self-diagnose symptoms as food intolerances using a non-medically supervised elimination diet may be ignoring symptoms of more serious and progressive diseases such as **celiac disease**, Crohn's disease, gastroesophageal reflux disease, **irritable bowel syndrome**, and other health problems that need medical treatment.

Patients need to know that following a strict elimination diet is not an easy matter. It is extremely important to read packaged-food labels carefully because many processed foods contain monosodium glutamate, sugar, and other substances that may be prohibited. It is almost impossible for elimination-diet patients to eat in restaurants, at school, or at the homes of friends. The resulting isolation must be considered as part of the decision to undertake an elimination diet. Patients should also consider whether they have sufficient time for the extra planning, shopping, and food preparation involved.

Elimination-diet patients should be vigilant to replace any nutrients missing from their restricted diet. For example, **calcium** supplements may be advisable for someone eliminating dairy products from the diet. Any prescribed medications should be continued during any diet.

Putting a very young child on an elimination diet may endanger the child's **nutrition** and normal growth. A breastfeeding mother may harm both her own health and that of her infant if she undertakes an elimination diet during lactation.

Side effects

The most significant side effects of an elimination diet are nutritional disorders resulting from a prolonged, highly restrictive diet, and the risk of a serious reaction as suspect foods are reintroduced to the diet. Some proponents also caution that patients consuming a very limited variety of foods risk becoming allergic to those very foods. For these reasons, professional supervision and substitution of missing nutrients are both essential.

KEY TERMS

Anaphylactic shock—An extreme allergic reaction characterized by swelling, constriction in the bronchi, circulatory collapse, heart failure, and even death.

Urticaria—Itchy pustules that may be caused by a hypersensitivity to food, drugs, or other substances.

Research and general acceptance

Elimination diets are widely used by medical doctors, but considerable differences of opinion exist over the range of illnesses that may be caused by food allergies or intolerances. Many physicians and researchers question the role of allergies in migraine, **rheumatoid arthritis**, **osteoarthritis**, and other conditions. Some doctors suggest that elimination diets should be used only after other diagnostic methods have been tried, including history-taking, skin tests, blind food challenges, and radioallergosorbent testing.

Training and certification

Because of the risks involved, elimination diets should be undertaken only under competent medical supervision. Some patients may wish to consult an allergy specialist.

Resources

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Scott-Moncrieff, Christina. *Overcoming Allergies: Home Remedies, Elimination and Rotation Diets, Complementary Therapies.* London: Collins & Brown, 2002.

ORGANIZATIONS

American Dietetic Association,120 South Riverside Plaza, Suite 2000, Chicago, IL 60606-6995, (800) 877-1600, http://www.eatright.org.

Chronic Fatigue and Immune Dysfunction Syndrome Association of America (CFIDS), P. O. Box 220398, Chapel Hill, NC 20222-0398, http://www.cfids.org.

David Helwig
Helen Davidson

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Emphysema

Definition

Emphysema is a progressive, incurable chronic lung condition that usually develops after many years of tobacco **smoking** or exposure to air-borne pollutants. The air sacs (alveoli) at the end of the bronchial tubes are destroyed, and oxygen uptake is restricted due to the loss of elasticity of lung tissue.

Description

Emphysema frequently occurs with one or more other respiratory diseases, such as **bronchitis** and **asthma**. It is one of those diseases that are collectively referred to as chronic obstructive pulmonary disease (COPD).

Normally functioning lungs are elastic and efficiently expand and recoil as air passes freely through their passageways (bronchi) to the alveoli, where oxygen is moved into the blood and carbon dioxide is filtered out. When individuals inhale cigarette smoke or air-borne pollutants, their immune system responds by releasing substances that are meant to defend the lungs against the smoke. These substances can also attack the cells of the lungs, but the body normally inhibits such action with the release of other substances.

When individuals are exposed to air pollution or occupational pollutants over a long period of time, the lung tissue becomes damaged in such a way that it loses its elasticity. When damage has occurred to the alveoli, patients have difficulty making a complete exhalation, which causes residual volume (air trapped inside the lungs). With the passage of time, this residual volume causes the chest to permanently expand and become barrel shaped. As the disease progresses, increasingly more effort is needed to breathe.

Demographics

As reported by the American Lung Association, approximately 4.1 million Americans were diagnosed with emphysema in 2006, and 93% were aged 45 or older. This group included an estimated 3.7 million Caucasians and 193,000 African Americans affected by the condition. Men have a higher prevalence of emphysema than women; with 2.5 million men affected compared to 1.6 million women, as reported in 2006.

Every year, approximately 100,000 people die of the disease, making it the fourth largest cause of mortality in the United States (after **heart disease**, **cancer**, and **stroke**), according to the National Emphysema Foundation.

Giant bullous emphysema is a rare type of emphysema of unknown origin that affects young men, usually smokers. It is characterized by large (>1 cm in diameter) bullae in the alveoli of the upper lobes that greatly increase the risk of pneumothorax (collapsed lung). Bullae are round bubbles or air cavities that expand from beneath the pleura (thin membranes that line the lungs) and put pressure on the lungs, causing severe lung dysfunction. A giant bulla is defined as taking up one-third or more of the space in and around the affected lung. Surgical treatment is usually required to treat this type of emphysema.

Causes and symptoms

Causes

Smoking is the primary cause of emphysema. Environmental exposure and genetic factors are other contributing factors.

GENETICS. An inherited disorder called alpha 1-antitrypsin (AAT) deficiency can increase the risk of emphysema. AAT is a protein produced in the liver that is transported to the lungs to aid proper breathing function and to reduce inflammation. In people with AAT deficiency, the liver produces little or no AAT to offer these protective properties, which can lead to alveoli damage and restricted oxygen uptake.

ENVIRONMENTAL EXPOSURE. Emphysema has traditionally been a disease suffered by miners, particularly coal miners, as the fine dust that results from mining attacks the alveoli over time. Most miners develop emphysema to some degree after a lifetime in the mining pit. In fact, emphysema is sometimes referred to as miner's lung or black lung. Due to awareness of the causes of emphysema and improved working conditions for many miners, the incidence of emphysema has somewhat decreased in this population.

Any worker who is exposed to abnormal levels of dust, fumes, smoke, gases, vapors or mists over a long period of time may be at risk for emphysema. This group of workers includes sand blasters and metal grinders, as well as individuals who are exposed at work to **silica** (silicosis), asbestos (asbestososis), or **iron** filings (siderosis). In addition, dust from wood, cotton, talc, cereal grains, coffee, pesticides, drug or enzyme powders, or fiberglass may cause emphysema. People who use their lungs in their work are also susceptible (such as trumpet players and glass blowers).

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People who develop emphysema as a result of their work often develop asthma prior to emphysema.

Symptoms

People with emphysema typically complain that they cannot get enough air as stale air builds up inside the lungs and the person is starved of oxygen. Coughing, **wheezing** and chronic mucus production, blueness of the lips and fingernails, and exhaustion are common symptoms.

Diagnosis

A diagnosis of emphysema is not made on the basis of symptoms alone. A detailed medical history is taken along with x rays and pathology examinations. Diagnostic tests may include:

- chest x ray
- pulmonary function tests (also called spirometry) to determine air flow in the lungs and the movement of oxygen in the blood
- pulse oximetry to measure blood oxygen saturation
- arterial blood gas test to determine the amount of oxygen and carbon dioxide in the blood
- exercise testing to determine if the oxygen level in the blood drops during exercise
- electrocardiogram to rule out heart disease as a cause of shortness of breath

Treatment

Damage to the lungs as a result of emphysema cannot be reversed, so preventative measures to limit its progression are essential. The following measures and treatments are regarded as beneficial for emphysema patients.

Herbalism

Herbs can be beneficial in relieving the symptoms of emphysema, helping the body to ward off infection, and easing the asthmatic symptoms that often accompany emphysema.

Some beneficial herbs are:

- Lobelia: This is a mild sedative, also having strong expectorant properties. It is widely used for chest complaints, including emphysema and bronchitis, and can help to shorten an asthma attack.
- Thyme: A tea made with thyme is recommended for overcoming shortness of breath. It is also a powerful antiseptic.
- Mullein: This is another traditional remedy for chest complaints. To make a tea, boil two tablespoons of the dried leaves with a glass of milk and drink the mixture.
- Echinacea: Echinacea is a powerful immune system stimulant and strengthens the body in general, warding off colds and infections.
- Lungwort: A member of the borage family, this herb is very healing for the lungs. It should be taken as an infusion.
- Black cohosh: This herb is an expectorant and astringent. It relieves coughing.
- Sage: This is one of the most useful of all herbs and is said to be good for whatever it is taken for. It is antiviral and bactericidal.
- Garlic: A very powerful anti-viral, garlic can be of real help to those trying to avoid infections and lung congestion.

Chinese herbal medicine

Qing Qi Hua Tan Wan (**Pinellia** expectorant pills) are the Chinese herbalists' treatment for chronic lung complaints, particularly bronchitis and asthma.

Juices for emphysema

Kitty Campion, a British naturopathic herbalist expert, recommends the following juices for the treatment of emphysema: equal parts of carrot juice, parsnip juice, watercress juice, and potato juice, or equal parts of orange juice and lemon juice, diluted half and half with a strong decoction of rosehip tea.

Aromatherapy

Aromatherapy involves massaging the patient with potent plant **essential oils**, which have been proven to enter the circulation through the skin. The constituents of the oils can have a powerful effect on a variety of illnesses, but since their beneficial qualities are also transported through the air, they are considered to be doubly beneficial to those who have respiratory ailments.

Aromatherapy oils for respiratory disease:

- *Canada balsam* may alleviate respiratory symptoms and is an expectorant. It is also a bactericide and recommended for those with chronic chest ailments.
- *Tolu balsam* is an excellent treatment for chest infections.
- *Frankincense* is good for infection and catarrhal discharge.

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- *Niaouli* is a very strong antiseptic and beneficial for pulmonary trouble.
- *Rose damascena* is recommended for bronchial complaints, and it also lifts the spirits.
- *Tea tree oil* is one of the most potent anti-viral, antibacterial and anti-fungal agents known to herbal medicine, therefore, highly beneficial as a preventative measure against chest infection.

Acupuncture

This ancient Chinese system of holistic treatment works on the principal that illness is the result of blockage in the flow of life force. The practitioner aims to stimulate relevant meridians in the body and thus release trapped life force, returning bodily functions to normal. The treatment is virtually painless.

Treatment can be expected to improve blood circulation and the capacity of the body to restore itself. Research has indicated that **acupuncture** can produce changes in the electrical fields of body cells, which promote a return to the body's normal state. Consequently, few negative side effects are associated with acupuncture treatment.

Breathing techniques

Very few people actually breathe correctly, and if lung function is not up to par, the difference between breathing fully and taking shallow, ineffective breaths can make a remarkable difference to the way persons feel and their bodies functions. Oxygen shortage in the body promotes disease, and ensuring that oxygen levels are kept up can avert disaster, even with the existence of lung-impairment. Improved breathing techniques can rid the body of free radicals, neutralize environmental toxins, and destroy many harmful microbes that cannot exist in an oxygen-rich environment. Without sufficient oxygen, the body cannot fully utilize nutrients from food, and bodily functions generally become less efficient, so every effort must be made to promote proper breathing, in order to offset the effects of reduced lung function.

In cases of emphysema, it is particularly important to ensure that the out breath expels all of the previous in-breath. When exhalation is incomplete wastes produced by breathing are not expelled from the body in the normal way and residual volume, which is a common occurrence with progressive emphysema, may cause chest enlargement.

Postural positions can help manage shortness of breath by relieving strain on the upper chest. When sitting, patients can lean forward slightly, resting the elbows on the knees. When lying down, the patient can rest on his side with a pillow between his legs and his head elevated with pillows.

Homeopathy

Homeopathy is the treatment of illness according to a system of "like cures like" that stimulates the body to heal itself. While it could definitely contribute to the successful treatment of emphysema, homeopathy requires a qualified practitioner, as the patient's condition must be accurately assessed so that the correct remedy can be prescribed. Even for the same disorder, no two patients receive the same treatment.

Lifestyle

For lung dysfunction of any kind, it is vital to take steps to ensure that a person's lifestyle is not contributing to the problem. Pollution must be avoided at all costs, and steps should be taken to ensure that the living environment is free of chemical irritants, which may involve avoiding fragrances, as they can overburden damaged lungs. Some unscented products use a masking fragrance, which only increases toxicity. Common household products, such as fabric softeners, bleach, scented detergents, and furniture polish, can harm the body and the environment.

It must be noted that pesticides, fungicides, herbicides, and fertilizers are all neurotoxins (poisonous to the nervous system). Natural alternatives are obtainable for most household cleaning products. Personal care products can also cause damage, so only natural sources should be used. Chlorinated swimming pools should be avoided.

Every effort should be made to obtain food that is organically grown, in order to avoid pesticides and chemicals. Processed foods should be avoided because they often contain chemicals, dyes, and preservatives and because the food is stripped of most of its nutritional value. Notably, artificial sweeteners, particularly aspartame, break down into deadly poisons in the body.

Clothing should be all natural fibers, as permanent press and wrinkle-resistant clothes have often been treated with formaldehyde, which does not wash out. For the same reasons, synthetic fiber bed coverings should also be avoided. All plastic products should be avoided as much as possible as they all have toxic elements. Windows should be open as often as possible to increase oxygen in the atmosphere. Some houseplants should be acquired, as they give off oxygen.

It is also very important to undertake some form of gentle, regular **exercise** as this can do much to

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improve symptoms. Suitable forms of exercise may be swimming, walking, and gentle rebounding. If an emphysema patient is very weak, he could sit on a mini-trampoline while a helper does the strenuous bit; very real benefits will still be obtained in this way. Strenuous activities are not suitable for anyone with lung impairment.

Naturopathy

According to the principles of naturopathy, the body has the power to heal itself. Treatment should focus on providing the system with optimum **nutrition** in order that it can carry out all repairs necessary, which involves ensuring that all food that is eaten is of the highest quality.

Naturopaths advocate dietary supplements to assist with this process, and certain dietary supplements can be very valuable in arresting the progress of emphysema. Trials have been conducted involving treating emphysema patients with **vitamin A**, which is known to play an important role in healthy body tissue. **Vitamin E** can also be helpful, and **vitamin C** should always be taken, as it is a catalyst for other nutrients. For best results, it is advised to consult a practitioner.

Allopathic treatment

Prior to any other treatment, it is essential that emphysema patients who smoke take steps to give up the habit. Otherwise, damage to the lungs will continue to go unchecked, and other measures will be very limited in their success. Apart from lifestyle changes, physicians generally recommend avoidance of infection, and antibiotics may be prescribed as a preventative measure.

A physician may also prescribe bronchodilator medicines (including beta agonists and anticholinergics) if there is any obstruction of the airways. For the same reason, anti-inflammatories, including corticosteroids, may also be prescribed. There are a variety of delivery methods for emphysema medications, including metered dose inhalers, dry powder inhalers, nebulizer breathing treatments, and powder-filled inhalation capsules.

Pulmonary rehabilitation, which typically includes chest physiotherapy, breathing exercises, and a program of physical exercise, is considered to benefit all emphysema patients, regardless of the degree of impairment. Supplemental **oxygen therapy** may be required at some stage.

Augmentation therapy is available for the treatment of alpha-1 antitrypsin deficiency. This intravenous therapy involves the delivery of AAT from healthy plasma donors, which replaces the so-called faulty AAT in the patient's blood. The dosage is adjusted based on the patient's body weight and is usually delivered once a week. As of 2008, further research was needed to evaluate the effectiveness of augmentation therapy in preventing the progression of emphysema.

In select patients, lung volume reduction surgery may be recommended. In this procedure, the damaged parts of the lung are removed, in order to allow healthy lung tissue to expand. If successful, this surgery may eliminate the need for supplemental oxygen and improve breathing function. However, the National Emphysema Therapy Trial (NETT) demonstrated that only a small number of people with COPD actually benefit from this surgery. Therefore, careful screening is required to determine patient eligibility.

Bullectomy is the surgical removal of bullae that may develop with the giant bullous emphysema. This procedure results in improved total lung capacity and overall morbidity improvements.

A final resort is lung transplant surgery. Because of the relatively large risk involved, transplant surgery is carried out in only a small minority of patients.

Promising research is being conducted to evaluate several less-invasive procedures to treat emphysema. These procedures include bronchoscopic techniques to reduce lung volume, including bypass stents; bronchial occlusive devices; and endobronchial valves, as well as biological reagents to remodel and shrink damaged lung tissue. Minimally invasive surgical techniques are also being evaluated.

Prognosis

It is generally accepted that emphysema is incurable. Physicians and alternative medicine practitioners assert that they can relieve patients greatly from symptoms and halt the progress of the disease with appropriate management, preventative measures, along with the patient's lifestyle changes.

Prevention

Individuals who feel that their work conditions are likely to be a possible cause of emphysema should take steps to protect themselves. A respirator should be worn, at least until work conditions can be improved. Improving ventilation can also help remedy working conditions.

Early diagnosis is vital to the successful management of emphysema. If preventative and therapeutic

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KEY TERMS

Acupuncture—An ancient Chinese system of treatment, which involves the painless insertion of very fine needles under the skin at certain key points on the body.

Alveoli—Small, thin-walled sacs located at the end of the smallest airways in the lungs where the exchange of oxygen and carbon dioxide takes place.

Anti-inflammatory—Medication that reduces inflammation (swelling in the airway and mucus production).

Bronchial tubes—Airways in the lungs that branch from the trachea (windpipe).

Bronchioles—The smallest branches of the airways in the lungs.

Bronchodilators—Medications that help relax the muscles surrounding the breathing tubes to aid breathing.

Catalyst—An agent that helps other substances to do their work.

Free radicals—The result of oxidization in the body, these molecules are chemically unbalanced and cause a chain reaction of damage to other molecules in the body, one of the prime causes of aging symptoms and deterioration in body functions.

Inflammation—A basic response in the body to infection, irritation or injury. Inflammation is marked by redness, warmth, swelling, and pain.

Naturopathy—A medical paradigm of diagnosis and healing based on removing the obstacles to cure and using as modalities: diet, therapeutic nutrition, botanical medicine, homeopathy, physical medicine, and counseling.

Peak Expiratory Flow (PEF)—A test used to measure how fast air can be exhaled from the lungs to measure the openness of the airways.

Pulmonary function tests—Tests that measure the amount and rate of air breathed in over a period of time. PFTs also measure how well the lungs move oxygen into the blood.

Residual volume—The amount of air trapped inside the lungs as a result of incompletely exhaling.

measures are taken at the early onset of symptoms, damage can be restricted and the outlook is positive. At all times, care should be taken to eliminate sources of pollution or chemical irritants from the environment, both in the home and elsewhere. The first step in overcoming emphysema for any patient should be to remove the cause, whether it be smoking, working conditions, or polluted atmosphere.

People with emphysema have an increased risk for developing lung **infections**. To reduce the risk of infection, patients should keep the house clean and free from excess dust and bathrooms free from mold or mildew; keep breathing equipment clean and covered when not in use; and frequently wash hands. Patients should notify their doctor if they have any of these signs of infection: increased shortness of breath, difficulty breathing or wheezing; coughing up increased amounts of mucus; change in color of mucus; **fever** or **chills**; increased **fatigue** or weakness; **sore throat** or **pain** when swallowing; unusual sinus drainage or nasal congestion; headaches or pain along upper cheeks.

Numerous smoking cessation programs are available, and physicians can provide referrals to community programs. The American Lung Association also offers many resources to help people quit smoking.

Regular exercise of moderate intensity may reduce lung function decline in smokers, as shown in a 2007 study published in the *American Journal of Respiratory and Critical Care Medicine*.

Resources

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PERIODICALS

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ORGANIZATIONS

American Academy of Allergy, Asthma and Immunology, 555 E. Wells St., Suite 1100, Milwaukee, WI 53202-3823, (414) 272-6071, http://www.aaaai.org.

American Lung Association, 61 Broadway, 6th Floor, New York, NY 10006, (800) 548-8252, (212) 315-8700, http://www.lungusa.org.

Global Alliance Against Chronic Respiratory Diseases (GARD), World Health Organization, Department of Chronic Diseases and Health Promotion, 20, Avenue Appia CH-1211 27, Geneva, Switzerland, http://www.who.int/respiratory/gard/en/=.

National Emphysema Foundation, 128 East Ave., Norwalk, CT 06851, (203) 866-5000, http://www.emphysemafoundation.org.

National Heart, Lung, and Blood Institute Information Center, PO Box 30105, Bethesda, MD 20824-0105, (301) 592-8573, http://www.nhlbi.nih.gov.

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Encopresis *see* **Constipation**

Endometrial cancer *see* **Uterine cancer**

Endometriosis

Definition

Endometriosis is a condition in which bits of tissue similar to the lining of the uterus (endometrium) grow in other parts of the body (and within the uterus). Like the uterine lining, this tissue builds up and sheds in response to monthly hormonal cycles. The blood discarded from these implants falls onto surrounding organs, causing swelling and inflammation. This repeated irritation leads to the development of scar tissue and adhesions.

Description

Endometriosis is estimated to affect 7% of women of childbearing age in the United States. It most commonly strikes between the ages of 25 and 40. Endometriosis can also appear in the teen years, but never before the start of **menstruation**. It is seldom seen in postmenopausal women.

Endometriosis was once called the career woman's disease because it was thought to be a product of delayed childbearing. The statistics defy such a narrow generalization; however, **pregnancy** may slow the progress of the condition. Women whose periods last longer than a week with an interval of less than 27 days between them seem to be more prone to the condition.

Endometrial implants are most often found on the pelvic organs, including the ovaries, uterus, fallopian tubes, and in the cavity behind the uterus. Occasionally, this tissue grows in such distant parts of the body as the lungs, arms, and kidneys. **Ovarian cysts** may form around endometrial tissue (endometriomas) and may range from pea to grapefruit size. Endometriosis is a progressive condition that usually advances slowly, over the course of many years. Doctors rank cases from minimal to severe based on factors such as the number and size of the endometrial implants, their appearance and location, and the extent of the scar tissue and adhesions in the vicinity of the growths.

Causes and symptoms

Although the exact cause of endometriosis is unknown, a number of theories have been put forward. Some of the more popular ones are:

- Implantation theory. This theory states that a reversal in the direction of menstrual flow sends discarded endometrial cells into the body cavity where they attach to internal organs and seed endometrial implants. There is considerable evidence to support this explanation. Reversed menstrual flow occurs in 70 to 90% of women and is thought to be more common in women with endometriosis.
- Vascular-lymphatic theory. This theory suggests that the lymph system or blood vessels (vascular system) are the vehicles for distribution of endometrial cells out of the uterus.
- Coelomic metaplasia theory. According to this hypothesis, remnants of tissue left over from prenatal development of the woman's reproductive tract transform into endometrial cells throughout the body.
- Induction theory. This explanation postulates that an unidentified substance found in the body forces cells from the lining of the body cavity to change into endometrial cells.

In addition to these theories, the following factors are thought to influence the development of endometriosis:

- Heredity. A woman's chance of developing endometriosis is seven times greater if her mother or sisters have the disease.
- Immune system function. Women with endometriosis may have lower functioning immune systems that have trouble eliminating stray endometrial cells, which would explain why a high percentage of

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women experience reversed menstrual flow while relatively few develop endometriosis.

- Dioxin exposure. Some research suggests a link between exposure to dioxin (TCCD), a toxic chemical found in weed killers, and the development of endometriosis.

While many women with endometriosis experience debilitating symptoms, others have the disease without knowing it. Strangely, there does not seem to be any relation between the severity of the symptoms and the extent of the disease. The most common symptoms are:

- Menstrual pain. Pain in the lower abdomen that begins a day or two before the menstrual period starts and continues until the end is typical of endometriosis. Some women also report lower back aches and pain during urination and bowel movement, especially during their periods.
- Painful sexual intercourse. Pressure on the vagina and cervix causes severe pain for some women.
- Abnormal bleeding. Heavy menstrual periods, irregular bleeding, and spotting are common features of endometriosis.
- Infertility. There is a strong association between endometriosis and infertility, although the reasons for this connection had not been fully explained as of 2008. Some experts believe that the buildup of scar tissue and adhesions blocks the fallopian tubes and prevents the ovaries from releasing eggs. Endometriosis may also affect fertility by causing hormonal irregularities and a higher rate of early miscarriage.

Diagnosis

The first step in diagnosing endometriosis is to perform a pelvic examination to determine if implants are present. Very often there is no strong evidence of endometriosis from a physical exam. The only way to make a definitive diagnosis is with a minor surgery called a laparoscopy. A laparoscope, a slender scope with a light on the end, is inserted into the woman's abdomen through a small incision near her navel. This procedure allows the doctor to examine the internal organs. Often, a sample of tissue is taken for later examination in the laboratory. Endometriosis is sometimes discovered when a woman has abdominal surgery for another reason such as tubal ligation or hysterectomy.

Various imaging techniques such as ultrasound, computed tomography scan (CT scan), or magnetic resonance imaging (MRI) can offer additional information but are not useful in making the initial diagnosis. A blood test may also be ordered because women with endometriosis have higher levels of the blood protein CA125. Testing for this substance before and after treatment can predict a recurrence of the disease, but is not reliable as a diagnostic tool.

Treatment

Although severe endometriosis should not be self-treated, many women find they can help relieve symptoms through alternative therapies. In a survey conducted by the Endometriosis Association, 40% to 60% of the women who used alternative medicines reported relief of **pain** and other symptoms.

Diet

A **high-fiber diet**, particularly from grains and beans, may decrease cramping and inflammation. The oils in seeds, nuts, and certain fish (cod, salmon, mackerel, and sardines) may help to relieve cramping. Carrots, beets, lemons, cauliflower, brussels sprouts, cabbage, onions, **garlic**, citrus fruits, vegetables, **chicory**, radicchio, and yogurt may help to reduce symptoms. Some women have found relief when they turned to a **macrobiotic diet** (one that is very restrictive and intended to prolong life). Occasionally, an allergy **elimination diet** may be recommended.

Sugar and animal fats can increase inflammation and aggravate pain. Milk and meat may contain hormones, so these should be avoided. Vegetarian or vegan **diets** may be recommended for those with endometriosis.

Supplements

The following supplements can be used to treat endometriosis:

- vitamin B complex to help the liver break down excess estrogen
- vitamin C to reduce heavy menstrual bleeding
- calcium
- bioflavonoids to help reduce heavy menstrual bleeding
- magnesium to relieve pain and flush out toxins
- vitamin E to heal inflamed tissues
- iron for anemia resulting from heavy bleeding
- lipotropic factors (Choline, methionine, and inositol enhance liver function)
- fish oil capsules, flax oil, or any essential fatty acid to reduce cramping

Several herbal remedies for endometriosis exist. The first four in this list are the most commonly used remedies:

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- Genistein (soy/isoflavone) helps the body excrete excess estrogen and possibly blocks estrogen's effect.
- Cramp bark (*Viburnum opulus*) helps ease cramping.
- Dong quai (*Angelica sinensis*) balances hormone levels and reduces inflammation.
- Black cohosh (*Cimicifuga racemosa*) helps the body excrete excess estrogen and improves the health of pelvic organs.
- Red clover (*Trifolium pratense*) balances hormone levels.
- Milk thistle (*Silybum marianum*) may improve liver function.
- Life root (*Senecio aureus*) may improve the health of pelvic organs.
- Feverfew (*Chrysanthemum parthenium*) eases pain and cramping.
- Dandelion eases pain and cramping and supports the liver.
- Yarrow (*Archillea millefolium*) eases cramping and restores hormonal balance.
- Evening primrose (*Oenothera biennis*) oil relieved endometriosis symptoms in 90% of patients in one study.
- Shepherd's purse (*Capsella bursa-pastoris*) reduces heavy menstrual bleeding and tones the uterus.
- Meadowsweet (*Filipendula ulmaria*) reduces pain.

Other treatments

Other remedies for endometriosis include **acupuncture** or **acupressure** to relieve pain, visualization, **guided imagery**, naturopathy, **homeopathy** (Lilium tigrum, **sepia**, and **belladonna**), **hydrotherapy**, **exercise**, and **meditation**.

Allopathic treatment

How endometriosis is treated depends on the woman's symptoms, her age, the extent of the disease, and her personal preferences. The condition cannot be fully eradicated without surgery. Treatment focuses on managing pain, preserving fertility, and delaying the progress of the condition.

Medication

Over-the-counter pain relievers such as aspirin, acetaminophen (Tylenol), ibuprofen (Motrin, Advil), and naproxen (Aleve, Naprosyn) are useful for mild cramping and menstrual pain. If pain is severe, a doctor may prescribe narcotic medications, although these can be addicting and are rarely used.

Hormonal therapies effectively tame endometriosis but also act as contraceptives. They include oral contraceptives, synthetic male hormones (danazol, gestrinone), progestins, and gonadotropin-releasing hormone antagonists.

Surgery

Endometrial implants and ovarian cysts can be removed with laser surgery performed through a laparoscope. For women with minimal endometriosis, this technique is usually successful in reducing pain and slowing disease progress. It may also help infertile women increase their chances of becoming pregnant.

Removing the uterus, ovaries, and fallopian tubes (a hysterectomy) is the only permanent method of eliminating endometriosis. This extreme measure deprives a woman of her ability to bear children and forces her body into **menopause**.

Expected results

Most women who have endometriosis have minimal symptoms and do well. Overall, endometriosis symptoms come back in an average of 40% of women over the five years following treatment. A 2002 review found that teenagers and young women under the age of 22 years have almost twice the chance of symptom recurrence after surgical removal of endometriosis compared with older women. Some researchers believe that younger women may have a different form of endometriosis than that found in older women.

With hormonal therapy, pain returned after five years in 37% of patients with minimal symptoms and 74% of those with severe cases. The highest success rate from conservative treatment followed complete removal of implants using laser surgery. Of these women, 80% were still pain-free five years later. Hysterectomy may be necessary should other treatments fail.

Prevention

There is no proven way to prevent endometriosis. One study, however, indicated that girls who begin participating in aerobic exercise at a young age are less likely to develop the condition.

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KEY TERMS

Adhesions—Web-like scar tissue that may develop as a result of endometriosis and bind organs to one another.

Endometrial implants—Growths of endometrial tissue that attach to organs, primarily in the pelvic cavity.

Endometrium—The tissue lining the uterus that grows and sheds each month during a woman's menstrual cycle.

Estrogen—A female hormone that promotes the growth of endometrial tissue.

Laparoscopy—Procedure used to diagnose and treat endometriosis. It is performed by inserting a slender, wand-like instrument through a small incision in the woman's abdomen.

Menopause—The end of a woman's menstrual periods when the body stops making estrogen.

Retrograde menstruation—Menstrual flow that travels into the body cavity rather than out through the vagina.

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ORGANIZATIONS

Endometriosis Association, International Headquarters, 8585 North Seventy-Sixth Place, Milwaukee, WI 53223, (414) 355-2200, http://EndometriosisAssn.org.

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Energy medicine

Definition

Energy medicine is based upon the belief that changes in the "life force" of the body, including the electric, magnetic and electromagnetic fields, affect human health and can promote healing.

Origins

The notion of a life force or energy is shared by people around the world. Since ancient times, traditional cultures have believed that a special energy vitalizes all life. This energy is known as chi, prana, pneuma, orgone, mana, ether, odyle, élan vital, biocosmic energy and many other names.

Early Ayurvedic references to a life force, or prana, go back to the eighth century B.C. In the West, as early as the sixth century B.C., Pythagoras conceived of a life energy, or pneuma, visible in a luminous body. A century later, Hippocrates, the father of modern medicine, recognized the body's natural capacity for healing, or *Vis medicatrix naturae*. He instructed physicians to find the blocking influences both within a patient and between them and the cosmos, in order to restore the healing life force. Nature, not the doctor, is the source of healing.

In the sixteenth century, the Swiss alchemist and physician Paracelsus reported "a healing energy that radiates within and around man like a luminous sphere." He believed this energy could cause and cure disease and could work from a distance. He also thought that magnets, planets, and stars could influence this energy. There are echoes of these beliefs in some of theories and practices of contemporary energy medicine. However, the ideas of Francis Bacon and the French philosopher and mathematician René Descartes have had a much greater impact on Western medicine as a whole.

Bacon applied logical mathematical concepts to analyze humans and the world. He believed that the laws of science should be used to "master rather than become harmonious with nature." Descartes proposed that the body, which was measurable, and the mind, which was immeasurable, were firmly separate. The body could influence the mind but the mind could not influence the body. These notions promoted the search for physical causes of human illness. They also led to a denial of the mind's ability to affect physical health. As a result, mainstream science came to devalue or reject any phenomenon that cannot be measured or objectively proved.

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KEY TERMS

Aura—A light or radiance that is claimed to emanate from the body and to be visible to certain persons with psychic or spiritual powers.

Bioenergetics—The study of energy transformation in living systems.

Paradigm—A pattern or model.

From the seventeenth century onward, Western medicine has focused primarily upon the physical aspects of disease. Scientists who studied forces within the body that were difficult to measure were often ignored or ridiculed. The Austrian psychiatrist Wilhelm Reich, who had been a student and colleague of Sigmund Freud, was jailed and his books publicly burned because of his theories about "orgone" energy. His views, however, have influenced the development of many body-mind approaches, particularly bioenergetics.

The 1990s brought a new emerging scientific paradigm in relation to medicine and health care. According to biophysicist Beverly Rubik, this emerging paradigm "... celebrates the creative, subtle, empowering, wise, and enduring features of life that were never acknowledged during the age of machines and mechanistic thought. Living systems are self-organizing systems that expend energy in order to maintain their coherence and integrity...Healing is ultimately self-healing, a natural response to internal dynamic shifts or external challenges." This new paradigm also conveys that "...very small or subtle stimuli applied to the body-mind can have profound effects and set a person on the road to recovery."

Benefits

In a 1990 review of more than 131 controlled scientific studies of healers from around the world, Dr. Daniel Benor found evidence of healing for a wide range of human conditions. These include changes in immune system functioning as well as improvement of skin—wound healing, blood pressure, nearsightedness, **leukemia**, **anxiety**, **asthma**, **bronchitis**, **epilepsy**, tension **headache**, neck and back **pain**, post-operative pain, self-esteem, **heart disease**, and relationships.

Patients have also reported spontaneous healing of a variety of conditions including **cancer** and paralysis. Spiritual awakenings or new attitudes and a fresh sense of meaning in life can also result from energy healing.

Description

Energy medicine is a broad term that includes touch therapies, movement therapies, spiritual healing, **meditation**, magnetic field therapy, **homeopathy**, **acupuncture**, **light therapy**, and other innovative methods of healing. What these various approaches have in common is an energetic understanding of health and healing. These therapies may affect the patient's internal energy, external energy (aura, or other energy fields surrounding the body) or both. Many of these therapies fall into several different categories at once and their benefits may not be exclusively due to changes in life force. Energetic touch therapies include, but are not limited to, **reiki**, **therapeutic touch** (although the physical body is not touched), watsu, **polarity therapy**, Ayurvedic massage, zero balancing, **reflexology**, Jin Shin Jyutsu, **lomilomi**, **breema** bodywork, **Thai massage**, **shiatsu**, amma, Chi Nei Tsang, Jin Shin Do, Shen, and **Chinese massage**, and **acupressure**. Energetic movement therapies include **qigong**, **t'ai chi** chuan, aikido, karate, and **yoga** (there are many different forms of yoga). Spiritual healing includes distance healing, laying on of hands, meditation, ceremony, ritual and other shamanic practices.

Some of the methods of energy medicine involve gentle physical touch, while others work with the energy around the body with the practitioner holding his or her hands several inches away. Some methods can be applied from a distance, others require attendance at a ceremony and may include family and friends. The movement modalities may require learning and practicing a particular movement or breath sequence. Other therapies may involve wearing magnets, being exposed to various kinds of light rays, or receiving energy stimulation with needles and heat.

The duration and cost of an energy medicine session vary greatly depending upon the method and the healer. Some methods are expensive while others are free or offered for a modest donation. These modalities are not covered by insurance unless administered by a licensed health care professional.

Preparations

The amount and type of preparation vary. While some forms of energy medicine require no specific preparations, others do. These preparations may range from wearing loose clothing for yoga and other movement therapies, to an hour-long diagnostic interview with a practitioner of **traditional Chinese medicine** prior to receiving certain types of Chinese massage. In general, people with heart problems,

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CAROLINE MYSS (1953–)

Caroline Myss graduated with a B.A. in Journalism in 1974 from St. Mary of the Woods College in Terre Haute, Indiana. Working as a journalist in her native Chicago, Myss interviewed Dr. Elisabeth Kubler-Ross, M.D., who was devoted to the study of death and the dying. She credits Kubler-Ross with inspiring her to go on to Loyola-Mundelein University, a Jesuit school in Chicago, to get an M.A. in Theology in 1979. Myss then started a small New Age publishing company, consulted with holistic doctors, and gave individuals intuitive readings. It was her pairing with Dr. C. Norman Shealy, founder of the American Holistic Medical Association, in 1984, that began to thrust her into the limelight in energy medicine. With television appearances on such high-profile shows as *Oprah*, Myss is the best known intuitive on the circuit of holistic practitioners. Her belief stems from a principle that the mind and body work together to contribute to a person's well-being. While the traditional medical community is skeptical of the scientific basis for her claims, her international popularity continues to rise.

Her first book, *Anatomy of the Spirit*, was published in 1996, followed in the fall of 1997 with *Why People Don't Heal and How They Can*. Those, along with an audiotape series called *Energy Anatomy*, are bestsellers. By 2000, Myss discontinued private readings and devotes herself to workshops and seminars worldwide.

Myss can be contacted at her office, at 7144 N. Harlem Avenue, Chicago, IL 60631, or through her website: http://www.myss.com.

recent surgery, or back problems should consult a physician before attempting any of the movement therapies.

Precautions

Other treatments besides, or instead of, energy medicine may be needed for a particular disease or condition. In addition, persons who have experienced physical violence or abuse may have strong emotional reactions to therapies that involve physical contact; they should consult a knowledgeable counselor before undertaking these forms of treatment.

Side effects

The side effects can vary depending upon the modality. It is not unusual for people to experience some soreness or stiffness after a session of bodywork or movement therapies, particularly if they have not been accustomed to regular physical **exercise**. Some people experience headaches after light therapy. Lastly, some people find that energy therapies bring up painful emotions and memories.

Research and general acceptance

In the course of the past three decades, energy medicine has moved from being a marginal area of research to gaining a large measure of mainstream acceptance. The Human Potential movement of the 1960s and the counterculture of the early 1970s helped to stimulate popular interest in Eastern practices and belief systems, while the feminist movement of the same period led many women to explore mind/body connections and question the masculine assumptions and values of Western science and medicine. In recent years, the medical establishment has shown a new openness to research in the area of energy medicine, as was shown by the funding of the Office of Alternative Medicine at the National Institutes of Health. At present there are a number of clinical trials that have been designed to measure the effectiveness of alternatives to conventional treatment.

Despite over 300 studies during the past 40 years showing the efficacy of energy healing, however, these findings are still ignored or rejected by many scientists. Benor details many reasons for this rejection, including the fact that healers have not been able to produce results with reliability and consistency in a laboratory setting. Benor writes, "The time has come to accept that healing is the way it is. It appears to be influenced by multiple factors—so many, in fact, that it is virtually impossible to establish a repeatable experiment in which all would occur in the same combination more than once...We will have to be content with our human limitations and settle for approximate results, measured in probabilities over large numbers of trials. No apologies are needed. These are the limitations of healing."

Training and certification

There is no course of training leading to certification or licensure for energy medicine as such. Various schools of touch and **movement therapy**, as well as energy healing, offer their own forms of certification. The requirements vary according to each modality and each school. Spiritual healers may be certified through a school of energy healing, recognized within a particular religious tradition for their healing aptitude, or initiated into healing by another means. Many healers develop

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their healing gifts on their own. The evidence suggests that any caring person can develop a certain amount of healing ability through meditation, **prayer**, study with other experienced healers, and practice.

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ORGANIZATIONS

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Institute for Frontier Science. 6114 LaSalle Ave. Oakland, CA 94611. (510) 531-5767. E-mail: brubik@compuserve.com. http://www.healthy.net/frontierscience/.

International Society for the Study of Subtle Energies and Energy Medicine (ISSSEEM). 356 Goldco Circle. Golden, CO 80401. (303) 278-2228. http://www.vitalenergy.com/ISSSEEM.

Linda Chrisman

English plantain *see* **Plantain**

Enuresis *see* **Bedwetting**

Environmental therapy

Definition

Environmental therapy, also known as environmental medicine and formerly called clinical ecology, is the diagnosis and treatment of conditions caused by environmental factors.

Origins

The founder of environmental medicine was Theron G. Randolph, M.D., who was a trained specialist in internal medicine, immunology, and **allergies**. Several decades ago, Randolph became concerned with chronically ill patients who had symptoms of allergies and immune system disorders, but did not respond to conventional medical care. Randolph believed that patients were getting sick from environmental substances and pollutants that allergy specialists could not determine or did not recognize as causing illness. Conventional allergy specialists in Randolph's time believed that allergies could only be detected by measuring the response of immunoglobulin E (IgE). IgE is a particular antibody produced by the immune system when an antigen (foreign substance) triggers a reaction. Randolph believed that testing for allergies using only this technique limited the determination of immune system problems. Using other tests and techniques, he found that many substances that did not necessarily cause increased amounts of IgE could create allergic symptoms and complications in the body. Research has since shown that food allergies cause increases in immunoglobulin G (IgG) and not in IgE. Scientists now recognize that the immune system is too complex to be measured by only one test.

Randolph also found that allergic and toxic substances often produce subtle reactions in the body that may accumulate into major illnesses and problems. Many of these substances were not previously thought of as allergenic or toxic, including numerous common foods and chemicals (particularly petrochemicals and by-products of industry). Randolph determined that environmental agents could cause mental and behavioral disturbances as well as physical symptoms. Randolph and other doctors developed and used new diagnostic techniques, including intradermal (between skin layers) and sublingual (under the tongue) allergy tests, to determine exactly which environmental factors were influencing illnesses. Environmental doctors were able to heal many patients simply by removing certain foods and chemicals from their environment.

Randolph went on to dedicate his work to studying the interaction between patients and their environment. He and his colleagues called this new field of medicine clinical ecology, which was later changed to environmental medicine. The field's basic ideas are that doctors must consider both the patient and the patient's environment in treatment, and that there are cause and effect relationships between environmental factors and illness. Environmental factors include food, air, water, living arrangements, and workplace

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KEY TERMS

Allergen—A foreign substance, such as mites in house dust or animal dander that, when inhaled, causes the airways to narrow and produces symptoms of asthma.

Antibody—A protein, also called immunoglobulin, produced by immune system cells to remove antigens.

Fibromyalgia—A condition of debilitating pain, among other symptoms, in the muscles and the myofascia (the thin connective tissue that surrounds muscles, bones, and organs).

Hypersensitivity—The state where even a tiny amount of allergen can cause severe allergic reactions.

Multiple chemical sensitivity—A condition characterized by severe and crippling allergic reactions to commonly used substances, particularly chemicals. Also called environmental illness.

environments. For illnesses that are caused by exposure to negative environmental factors, healing can be induced not by drugs, but by testing for and removing the environmental causes of illness and by strengthening the patient's resistance.

Environmental therapists have isolated many substances that cause illness and adverse reactions in people, including chemicals, car exhaust, tobacco smoke, pesticides, drugs, food additives, and common allergens like dust, mold, animal dander, and pollen. Many people may also have allergic and negative reactions to common foods such as dairy products, corn syrup, sugar, wheat, certain fruits and vegetables, nuts, and meat. Exposure to toxic and allergenic substances may exert a cumulative effect on the body, weakening and taxing the immune system over time so that the body becomes hypersensitive (more susceptible) to substances that were once tolerated.

In 2002, a Harvard University study demonstrated that global warming was adding to the presence of airborne allergens like ragweed pollen. Atmospheric carbon dioxide concentration is up 29% since industrial times began and is expected to double again in the next 50 to 100 years. The heavy carbon dioxide concentration helps plants grown faster and larger, producing more allergens.

Environmental medicine has become increasingly popular in the last few decades as the public has become more aware of environmental pollution. Every year, more than 700,000 different chemicals are released into the environment, and the figure has been growing by 10% or more per year. Toxic or allergenic chemicals can be found in everything from common household materials like carpet and furniture to basic items like food and water. Environmental therapists believe that new medical problems have arisen due to the immune system's inability to handle all of the new pollutants and synthetic chemicals to which it is exposed. Environmental illness is the cumulative effect of lengthy or constant exposure to these toxins. Those with environmental illness become hypersensitive to even minute quantities of common materials. Environmental hypersensitivity can cause severe disability in many people.

Environmental medicine recognizes that some new and baffling illnesses have appeared that conventional medicine either does not recognize or is unable to treat, sometimes called "twentieth century diseases." These conditions include environmental illness/multiple chemical sensitivity (EI/MCS), **chronic fatigue syndrome**, **fibromyalgia**, **Gulf War syndrome**, and **sick building syndrome**. Furthermore, diseases for which environmental causes are believed to be major factors are also increasing (like **cancer** and **asthma**), making environmental medicine increasingly important.

Benefits

Environmental medicine is helpful for patients with chronic allergies, asthma, chronic **fatigue** syndrome, EI/MCS, fibromyalgia, Gulf War syndrome, and sick building syndrome. It is helpful for those with conditions that are influenced by environmental factors, such as cancer, as well as for those who have been exposed to high levels of toxic materials due to accident or occupation. Environmental medicine is also used for people with allergic or immune system problems that conventional medicine is unable to diagnose or treat. Symptoms for patients with environmental illness include unexplained fatigue, increased allergies, hypersensitivity to common materials, intolerance to certain foods and **indigestion**, aches and pains, low-grade **fever**, headaches, **insomnia**, **depression**, sore throats, sudden weight loss or gain, lowered resistance to infection, general malaise, and disability.

Description

Environmental therapy treats patients by first identifying the environmental causes of illness. The

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next step is removing environmental causes and reducing exposures to all potential toxins. Cleansing and detoxifying the body of toxic substances and supporting overall (holistic) healing and recovery are the other components of the treatment process.

The cost of treatment by a practitioner of environmental medicine can vary depending on the education of the practitioner. Costs are generally comparable to visits to trained medical specialists. Practitioners may be conventionally trained medical doctors, researchers with graduate degrees in environmental medicine, or alternative medicine practitioners such as homeopaths, **Ayurvedic medicine** practitioners, **traditional Chinese medicine** practitioners, and naturopaths. Treatment costs vary, depending on the type and number of tests required to identify problems and the subsequent healing therapies required. Many insurance policies cover costs of environmental therapy, particularly when the practitioner is a certified medical doctor. Consumers should be aware of their insurance company's policies on coverage.

Diagnosing environmental illness

Environmental therapists use extensive testing to determine the environmental factors that may be causing illness. These factors include infection, allergy, addictions, and toxic chemicals. **Infections** that often plague those with environmental illness can be caused by parasites, bacteria, viruses, and yeast. Blood, urine, stool, and hair analyses are used to measure a variety of bodily functions that may indicate problems. Environmental therapists have access to laboratories that specialize in sophisticated blood, urine, and other diagnostic tests.

In testing for environmental illness, liver function is studied closely because the liver is the principle organ in the body responsible for removing toxic compounds. Another useful blood test is a test for **zinc** deficiency, which may indicate **heavy metal poisoning**. Heavy metal poisoning can be caused by lead, mercury, arsenic, cadmium, and aluminum, all of which are present in the environment. Hair analysis is also used to test for heavy metal toxicity. Blood and urine tests can also be completed that screen for toxic chemicals such as PCBs (environmental poisons), formaldehyde (a common preservative), pesticides, and heavy metals. Immune system tests, which show levels of particular antibodies, can also indicate specific environmental factors. Hormone levels also may indicate environmental illness. Certain blood and urine tests may suggest nutritional deficiencies and proper recovery **diets** can be designed for patients.

Environmental therapists also perform extensive allergy and hypersensitivity tests. Intradermal and sublingual allergy tests are used to determine a patient's sensitivity to a variety of common substances, including formaldehyde, auto exhaust, perfume, tobacco, chlorine, jet fuel, and other chemicals.

Food allergies require additional tests because these allergies often have reactions that are delayed for several days after eating the food. The RAST (radioallergosorbent test) is a blood test that determines the level of immunoglobulins in the blood after specific foods are eaten. The cytotoxic test is a blood test that determines if certain substances affect blood cells, including foods and chemicals. The ELISA-ACT (enzyme-linked immunoserological assay activated cell test) is considered one of the most accurate tests for allergies and hypersensitivity to foods, chemicals, and other agents. Other tests for food allergies are the elimination and rotation diets, where foods are systematically evaluated to isolate those that are causing problems.

Therapies used in environmental medicine

After environmental causes of illness are identified, the next step is to reduce or eliminate the patient's exposure to them to reduce the burden on the immune system. Patients are advised to immediately remove toxic and allergic agents from the home and workplace, and to make lifestyle and dietary changes to reduce exposure and to improve general physical and mental health.

Detoxification methods are used by alternative practitioners in treating environmental illnesses. These methods try to rid the body of accumulated toxic substances and to restore efficient functioning. Detoxification methods include dietary therapies, **fasting**, **exercise**, sweating, laxatives, enemas, and other techniques that stimulate and support the body's natural detoxification mechanisms. Nutritional and herbal supplements are used in the detoxification and strengthening process. These supplements include **antioxidants** and vitamins, numerous herbs that detoxify the body and stimulate the immune system, and enzymes to improve digestion. Natural and holistic treatments are used to rebuild and strengthen the patient's overall health and resistance. Traditional healing systems such as traditional Chinese medicine, naturopathy, ayurveda, and **homeopathy** may be used as therapeutic programs for environmental illness.

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Preparations

Patients can assist diagnosis and treatment by keeping detailed diaries of their activities, symptoms, and contact with environmental factors that may be affecting their health.

Side effects

If detoxification treatments are used, patients may experience side effects of fatigue, malaise, aches and pains, emotional duress, **acne**, headaches, allergies, and symptoms of colds and flu. Detoxification specialists claim that these negative side effects are part of the healing process. These reactions are sometimes called *healing crises*, which are caused by temporarily increased levels of toxins in the body due to elimination and cleansing.

Research and general acceptance

Environmental medicine is gaining more respect in the medical community and is now a field in conventional medicine. Many leading medical schools and universities offer programs or specialties in environmental medicine. Research in environmental medicine is being widely funded and conducted by mainstream organizations such as the National Institutes of Health, the Environmental Protection Agency, as well as alternative medical schools. The National Academy of Science recognizes that many illnesses are caused or influenced by environmental factors, including cancer and **multiple chemical sensitivity**. The U.S. Centers for Disease Control estimates that up to 82% of diseases may be due to environmental and lifestyle factors.

Training and certification

The American College of Occupational and Environmental Medicine is the world's largest organization for environmental medicine. Its members include certified and practicing doctors. The American Academy of Environmental Medicine certifies environmental medicine practitioners. The National Institute of Environmental Health Sciences is affiliated with the National Institutes of Health. It conducts research in environmental medicine and supports several academic programs of study in environmental medicine, including those at Harvard, Oregon State University, Vanderbilt, University of California, and MIT.

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Journal of Occupational and Environmental Medicine 1114 N. Arlington Heights Rd., Arlington Heights, IL 60004. (847) 818-1800.

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American Academy of Environmental Medicine. 23121 Verdugo Dr., Suite 204, Laguna Hills, CA 92653. (714) 583-7666.

Center for Occupational and Environmental Medicine. 7510 Northforest Dr., North Charleston, SC 29420. (843) 572-1600. http://www.coem.com.

Northwest Center for Environmental Medicine.177 NE 102nd St., Portland, OR 97220. (503) 561-0966.

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Environmental therapy, Clinical ecology *see* **Water**

Enzyme therapy

Definition

Enzyme therapy is a plan of dietary supplements of plant and animal enzymes used to facilitate the digestive process and improve the body's ability to maintain balanced metabolism.

Origins

Enzymes are protein molecules used by the body to perform all of its chemical actions and reactions. The body manufactures several thousand enzymes. Among them are the **digestive enzymes** produced by the stomach, pancreas, small intestine, and the salivary glands of the mouth. Their energy-producing properties are responsible for not only the digestion of nutrients, but their absorption, transportation, metabolism, and elimination as well.

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Enzyme therapy is based on the work of Edward Howell in the 1920s and 1930s. Howell proposed that enzymes from foods work in the stomach to pre-digest food. He advocated the consumption of large amounts of plant enzymes, theorizing that if the body had to use less of its own enzymes for digestion, it could store them for maintaining metabolic harmony. Four categories of plant enzymes are helpful in pre-digestion: protease, amylase, **lipase**, and cellulase. Cellulase is particularly helpful because the body is unable to produce it.

Animal enzymes, such as pepsin extracted from the stomach of pigs, work more effectively in the duodenum. They are typically used for the treatment of nondigestive ailments.

The seven categories of food enzymes and their activities are:

- Amylase: breaks down starches
- Cellulase: breaks down cellulose
- Lactase: breaks down lactose (milk sugar)
- Lipase: breaks down fats
- Maltase: breaks down maltose (malt sugar)
- Protease: breaks down proteins
- Sucrase: breaks down sucrose (table sugar)

Enzyme theory generated further interest as the human diet became more dependent on processed and cooked foods. Enzymes are extremely sensitive to heat, and temperatures above 118°F (48°C) destroy them. Modern processes of pasteurization, canning, and microwaving are particularly harmful to the enzymes in food.

Benefits

In traditional medicine, enzyme supplements are often prescribed for patients with disorders that affect the digestive process, such as cystic fibrosis, Gaucher's disease, diabetes, and **celiac disease**. A program of enzyme supplementation is rarely recommended for healthy patients. However, proponents of enzyme therapy believe that such a program is beneficial for everyone. They point to the ability of enzymes to purify the blood, strengthen the immune system, enhance mental capacity, cleanse the colon, and maintain proper pH balance in urine. They believe that by improving the digestive process, the body is better able to combat infection and disease.

Some evidence exists that pancreatic enzymes derived from animal sources are helpful in **cancer** treatment. The enzymes may be able to dissolve the coating on cancer cells and may make it easier for the immune system to attack the cancer cells.

A partial list of the wide variety of complaints and illnesses that can be treated by enzyme therapy includes:

- AIDS
- anemia
- alcoholism
- anxiety
- acute inflammation
- back pain
- cancer
- colds
- chronic fatigue syndrome
- colitis
- constipation
- diarrhea
- food allergies
- gastritis
- gastric duodenal ulcer
- gout
- headaches
- hepatitis
- hypoglycemia
- infections
- mucous congestion
- multiple sclerosis
- nervous disorders
- nutritional disorders
- obesity
- premenstrual syndrome (PMS)
- stress

Evidence to support enzyme therapy for treatment of these conditions tends to be sparse or lacking.

Description

Enzyme supplements are extracted from plants such as pineapple and papaya and from the organs of cows and pigs. The supplements are typically given in tablet or capsule form. Pancreatic enzymes may also be given by injection. The dosage varies with the condition being treated. For nondigestive ailments, the supplements are taken in the hour before meals so that they can be quickly absorbed into the blood. For digestive ailments, the supplements are taken immediately before meals accompanied by a large glass of fluids. Pancreatic enzymes may be accompanied by doses of **vitamin A**.

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Preparations

Enzyme preparations are available in a variety of forms, including tablets, capsules, liquid formations, and topical ointments.

Precautions

People with **allergies** to beef, pork, pineapples, and papaya may have allergic reactions to enzyme supplements. Tablets are often coated to prevent them from breaking down in the stomach and usually should not be chewed or crushed. People who have difficulty swallowing pills can request enzyme supplements in capsule form. The capsules can then be opened and the contents sprinkled onto soft foods such as applesauce.

Side effects

Side effects associated with enzyme therapy include **heartburn**, **nausea** and **vomiting**, **diarrhea**, bloating, **gas**, and **acne**. According to the principles of therapy, these are temporary cleansing symptoms. Drinking eight to ten glasses of water daily and getting regular **exercise** can reduce the discomfort of these side effects. Individuals may also experience an increase in bowel movements, perhaps one or two per day. This side effect is also considered a positive effect.

Plant enzymes are safe for pregnant women, although individuals should always check with a doctor before using enzymes. Pregnant women should avoid animal enzymes. In rare cases, extremely high doses of enzymes can result in a build up of uric acid in the blood or urine and can cause a break down of proteins.

Research and general acceptance

In the United States, the FDA has classified enzymes as a food. Therefore, they can be purchased without a prescription. Insurance coverage is usually dependent upon the therapy resulting from a doctor's orders. As of 2008, the use of enzyme therapy was still controversial among traditional physicians and some alternative healers. Scientific evidence for the effectiveness of enzyme therapy was still very limited.

Training and certification

There is no specific training or certification required for practicing enzyme therapy.

KEY TERMS

Celiac disease—A chronic disease characterized by defective digestion and inadequate fat metabolism.

Cystic fibrosis—A genetic disease that causes multiple digestive, excretory, and respiratory complications. Among the effects, the pancreas fails to provide secretions needed for the digestion of food.

Duodenum—The upper part of the small intestine.

Gaucher's disease—A rare genetic disease caused by a deficiency of enzymes needed for the processing of fatty acids.

Metabolism—The system of chemical processes necessary for living cells to remain healthy.

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EPA *see* **Fish oil**

Ephedra

Description

Ephedra, also known as Ma Huang, is banned from sale in the United States. On February 5, 2004, the United States Food and Drug Administration (FDA) issued a press release stating it prohibited the

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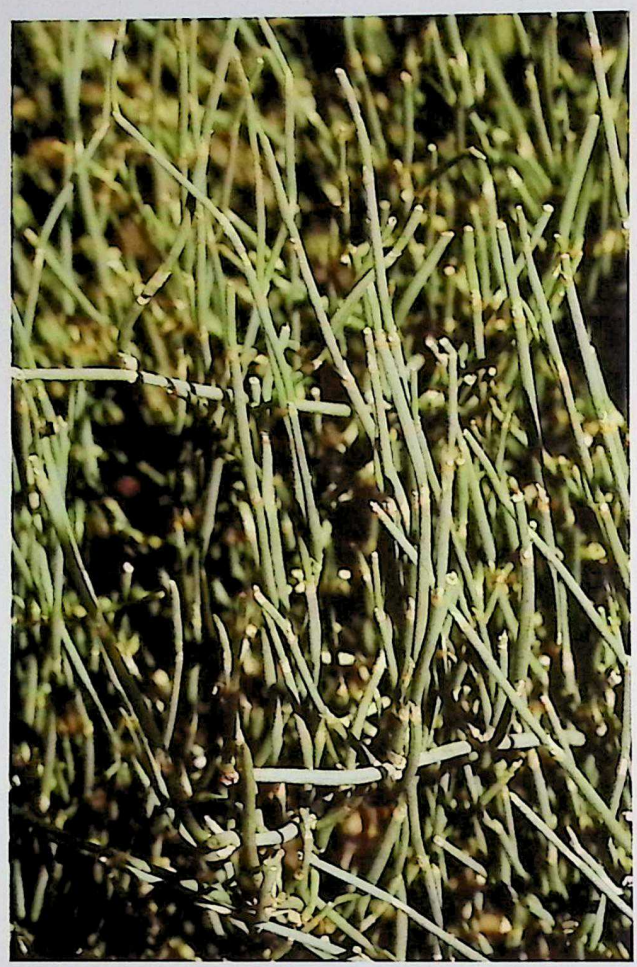

Ephedra. *(©PlantaPhile, Germany. Reproduced by permission.)*

sale of dietary supplements containing ephedrine alkaloids (ephedra) because such supplements present an unreasonable risk of illness or injury. The rule became effective 60 days later.

Although ephedra has a long history of medicinal use, the FDA, in banning ephedra, concluded that: "Multiple studies demonstrate that dietary supplements containing ephedrine alkaloids, like other sympathomimetics, raise blood pressure and increase heart rate. These products expose users to several risks, including the consequences of a sustained increase in blood pressure (e.g., serious illnesses or injuries including **stroke** and **heart attack** that can result in death). There is also a risk of increased morbidity and mortality from worsened heart failure and pro-arrhythmic effects. Although the pro-arrhythmic effects of these products typically occur only in susceptible individuals, the long-term risks from elevated blood pressure can occur even in nonsusceptible, healthy individuals. These risks are not outweighed by the known or reasonable likely benefits of dietary supplements containing ephedrine alkaloids. These products do not provide a meaningful health benefit. The best clinical evidence for a benefit is for weight loss, but even there the evidence supports only a modest short-term weight loss insufficient to positively affect cardiovascular risk factors or health conditions associated with being overweight or obese. Other possible benefits, such as enhanced athletic performance, enhanced energy, or a feeling of alertness, lack scientific support and/or they would provide only temporary benefits that are trivial in comparison to the risks."

This prohibition on sale of ephedra was appealed, and in 2005 sales of low-dose preparations were briefly reinstated, but on August 17, 2006, the U.S. Court of Appeals for the Tenth Circuit upheld the FDA's 2004 regulation. On May 14, 2007, the United States Supreme Court declined to review the decision, and so the FDA ruling remained in effect. Laws in other nations vary: In some countries ephedra is not restricted, while in others low doses are permitted.

Ephedra is an herb used by Chinese medicine for more than 2,500 years due to its ability to remedy symptoms of **asthma** and upper respiratory **infections**. A member of the Ephedracae family of herbs (*Ephedra sinica*), ephedra is native to northern China and Inner Mongolia where it thrives in desert areas as a jointed, barkless plant with branches that bear few leaves and tiny yellow-green flowers that bloom in summer. While varieties of ephedra grow throughout the world, the United States version flourishes in the dry southwest.

Ephedra became popular to Mormon settlers in the early 1800s as a stimulant consumed in the form of tea in place of the coffee and black tea from which they abstained, giving the plant one of its many names, Mormon tea. Other folk names that have resulted over time include desert tea, desert herb, and squaw tea. The herbal drink was named whorehouse tea after it was served in brothels during the 1800s due to unproven beliefs that it cured **gonorrhea** and **syphilis**.

The medicinal herb Ma Huang is made of the dried, young branchlets of ephedra. Harvested in the autumn, ephedra is reproduced from seed or by root division and the stems are dried in the sun throughout the year for production. The herb should be stored away from light. Ephedra gains its strength primarily from the alkaloid ephedrine, pseudephedrine, and norpseudephedrine. These active ingredients produce central nervous system stimulation.

Other key components of ephedra include:

- tannin, an acidic substance found in the bark
- saponin, originating in the roots

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- flavone, the chemical from which natural colors of many plants originate
- volatile oil

General use

A bitter-tasting herb that has been relied upon by the Chinese throughout centuries to heal ailments from fevers and **chills** to nasal and chest congestion, ephedra also maintains its prominence as a strong stimulant. Contrary to its reputation, Zen monks used the herb to promote calm concentration during **meditation**. However, larger amounts can make a person jittery. Before the 2004 ban, ephedra was used in the United States as an herbal medicine to treat asthma and **hay fever** and the beginnings of colds and flu. The herb was also used to raise blood pressure, cool fevers, and ease the **pain** of rheumatism.

While ephedrine was used in various decongestant and bronchodilator products in the United States beginning in the late 1920s through the 1940s, its potential for causing dangerous side effects led to the creation of a chemical substitute. Scientists created the equally effective, but safer pseudephedrine that remains the active ingredient in many over-the-counter (OTC) products such as Sudafed. Primatene Mist, an OTC that contains ephedrine, is used regularly to treat asthma.

The body responds to ephedra as one of its key ingredients, ephedrine, opens bronchial passages, activating the heart and raising blood pressure while increasing metabolism. Due to its stimulating effect on the nervous system, many weight loss and energy products contained ephedra. Ephedrine increases basal metabolic rate (BMR), causing the body to burn calories faster. Dieters used ephedra-based products because they suppress the appetite and stimulate metabolism. While these diet products proved to be effective, their results were rarely permanent, and long-term use was perceived to be quite harmful. Chinese sources only recommended its use for acute situations.

As an "energy" product, ephedra increases alertness and perception. The use of ephedra in this way dates back to bodyguards of Genghis Khan, who, legend has it, fearful of being beheaded if they fell asleep on duty, consumed tea containing ephedra to stay alert. **Caffeine** products, such as coffee, tea, chocolate, and cola drinks, enhance the effect of energy products containing ephedra. Additional medicinal uses of ephedra include the promotion of **menstruation**, the decreased desire for cigarettes, and the promotion of uterine contractions. Ma Huang is also known for its ability to increase sexual sensation.

Some controversy surrounds the extended use of ephedra. It is recommended that products containing ephedra be taken only for short periods of time. Tachyphylaxis, or becoming immune to a drug's effectiveness due to overuse, and dependence on the drug may develop when it is taken consistently over time. Both ephedrine and Ma Huang are considered doping substances. In April 1996, the FDA issued a warning on dietary supplements containing ephedra that were labeling themselves as safe substitutes for "street drugs," such as the illegal drug ecstasy. The FDA stated that these products could have "potentially dangerous effects on the nervous system and heart."

While questions surround the correct use of ephedra in the United States, the German government's Federal Institute for Drugs and Medical Devices (Commission E) certifies that ephedra herba, ephedra, and Ma Huang is an approved remedy for diseases of the respiratory tract with mild bronchospasms. Approval from Commission E, however, is not equivalent to the FDA's higher standards of drug approval.

Preparations

Before the 2004 ban in the United States, ephedra was available over the counter as a fluid extract, in tablet form, or as a dried bulk herb at Chinese pharmacies, Asian markets, and health food stores.

Chinese herbalists prepare ephedra for use by combining one part honey, four parts dried herb in combination with other herbs, and a small amount of water in a wok. The herbs are simmered over low heat until the water has evaporated and the herb begins to turn brown. Other forms of preparation include frying ephedra in vinegar or wine to improve its tonic effect on blood circulation and toasting it to an ash so that it may increase its ability to stop bleeding.

To treat **fever** and chills, Chinese herbalists recommend combining ephedra with cinnamon twig and other herbs. Coughing and **wheezing** are remedied with a mixture of ephedra and **apricot seed**, while **licorice** is added to the herb for **stomachaches**. An upper respiratory infection, or congestion, is treated with a combination of ephedra and **ginger**. The powder form, mixed with rehmannia, is also used by the Chinese to treat kidney energy (yin) deficiency.

When the United States adopted the herb for its healing properties, the variety of ephedra preparations increased. The average single dose of ephedrine for adults is 15–30 mg, with a maximum allowed daily dose of 300 mg per day. When consumed as a tea, 1 teaspoon (5 ml) of ephedra is boiled with 1 cup (250 ml) water for 15–20 minutes, with up to 2 cups (500 ml) of the tea allowed per day. This tea (also known as a decoction) is prescribed by herbalists for asthma. The tincture preparation is used in treatments to ease the

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aches and joint pains caused by rheumatism. The amount of tincture recommended is 1/4 teaspoon (1.25 ml)–1 teaspoon (5 ml) in combination with other herbs, up to three times a day.

Precautions

While ephedra has an extensive history of medicinal use, the supplement has shown to be harmful to children, adolescents, older or chronically ill people, and pregnant women or women who are breastfeeding. Those with **heart disease**, high blood pressure, **prostate enlargement**, pheochromocytoma, diabetes, **glaucoma**, thyrotoxicosis, overactive thyroid gland (**hyperthyroidism**), nervousness, anorexia, **insomnia**, suicidal tendencies, stomach ulcers, or bulimia should not take ephedra. The herb should be avoided by those with **diarrhea** or abdominal bloating.

Before its ban, ephedra was an ingredient in many weight-loss aids. While it is effective for a dieter's purpose as it accelerates the metabolism, the excess stimulation can cause dangerous consequences. The herb is extremely powerful as a stimulant, with its active ingredient epinephrine mimicking the effects of adrenaline. The molecular structure of epinephrine is close to methampetamine, also known as speed, and the use of ephedra can result in a positive test for amphetamines in the urine. Regular use of ephedra has been shown to lead to dependence on the herb.

Many cases of Ma Huang toxicity were reported to the FDA and possibly serious cardiovascular effects have been associated with its use. Health Canada issued a recall for products containing more than recommended levels of ephedra in early 2002 because of serious, possibly fatal, side effects. The dose limits set by Canadian authorities were more than 8 mg of ephedrine or a label that recommended more than 8 mg per dose or 32 mg per day. It also included products recommended use exceeding seven days.

A 2002 study concluded that use of Ma Huang could be associated with serious complications, including increased risk of stroke, heart attack or even sudden death, and urged that the effects were not limited to massive doses.

Side effects

Side effects of ephedra include insomnia, **dry mouth**, nervousness, irritability, **headache**, and **dizziness**. The following side effects are considered serious: increased blood pressure, increased heart rate, and heart palpitations. If these develop, the use of ephedra should be stopped, and a physician should be consulted immediately.

KEY TERMS

Central nervous system—Consisting of the brain and spinal cord, with their nerves and end organs that control voluntary acts; includes sensory and motor nerve fibers controlling skeletal muscles.

Dietary supplement—According to the United States Food and Drug Administration (FDA), any product intended for ingestion as a supplement to the diet.

Ergot preparations—A classification of drugs made from a fungus, used primarily for the treatment of migraines.

Metabolism—The result of all physical and chemical changes that take place within an organism, for example, the human body.

Pheochromocytoma—A tumor of the sympathoadrenal system that produces hypertension resulting in excessive headaches, sweating, and palpitation, apprehension, flushing of the face, nausea, and vomiting.

Thyrotoxicosis—Toxic condition due to hyperactivity of the thyroid gland.

Drugs that may cause adverse effects if combined with ephedra include:

- methyl xanthines, such as caffeine
- beta blockers
- Dexamthasone
- Reserpine
- Amitriptyline
- urinary alklinizers, such as sodium bicarbonate
- unrinary acidifiers, for example, ammonium chloride
- monoamine oxidase inhibitors, such as heart glycosides
- secale alkaloid derivatives, such as oxytocin
- Yohimbine
- Gaunethidine, which leads to the enhancement of the sympathomimetic effect, or stimulation of the nervous system

People who are taking any of these drugs should avoid ephedra. The isolated drug ephedrine (the active ingredient of ephedra) has also been shown to cause side effects if combined with other drugs, including antidepressants that increase the overall effect of ephedrine; methyldopa, due to possible increased blood pressure; and ergot preparations that may lead to

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serious blood pressure problems. Other substances that may cause alarming circumstances if combined with any form of ephedra include cocaine, **marijuana**, and caffeinated drinks. While it is known that Ma Huang taken with certain drugs and other substances may causes adverse effects, overall drug interactions with the supplement ephedra have not been thoroughly studied. It is recommended that a physician be notified before beginning the use ephedra in any form, or of any herbal supplement.

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American Botanical Council, PO Box 144345, Austin, TX 78714-7105, (800) 373-7105, http://abc.herbalgram.org/site/PageServer.

Food and Drug Administration, 5600 Fishers Lane, Rockville, MD 20857, (888) 463-6332, http://www.fda.gov/.

Herb Research Foundation, 4140 Fifteenth St., Boulder, CO 80304, (303) 449-2265, http://www.herbs.org/.

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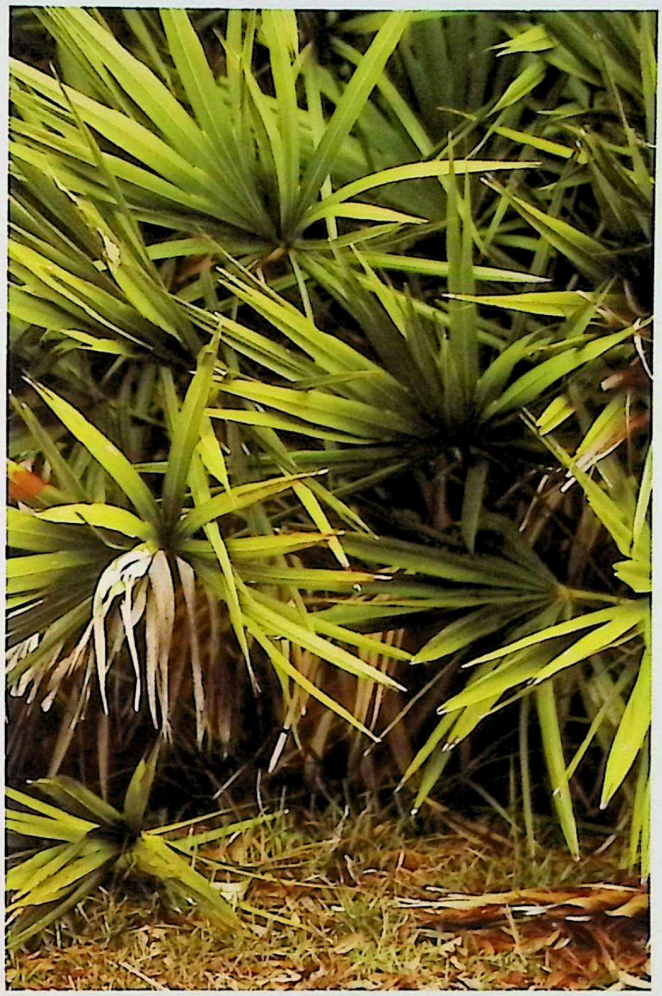
Epididymitis

Definition

Epididymitis is the inflammation or infection of the epididymis, the long coiled tube that attaches to the upper part of each testicle. The epididymis functions as a storage, transport, and maturation place for sperm before ejaculation.



Saw palmetto is one herbal remedy for epididymtis. *(David Davis / Photo Researchers, Inc.)*

Description

In adults, epididymitis is the most common cause of **pain** in the scrotum, and in adolescents, the second most common cause. The acute form is usually associated with the most severe pain and swelling. If symptoms last for more than six weeks after treatment begins, the condition is considered chronic.

Epididymitis is most common between the ages of 18 and 40, but children can get it, too. Boys who experience painful urination, have a history of urinary tract **infections**, abnormal bladder function, or abnormalities of the genitals and urinary structures are more inclined to get epididymitis. It is seldom found in adolescents who are not sexually active.

The infection is especially common among members of the military who **exercise** for extended periods without emptying their bladders.

Factors that increase the risk of developing epididymitis include:

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KEY TERMS

Acute—Refers to a condition or pain that is sharp and short in course.

Chronic—A condition that has a long duration.

Testicle—One of the two male sex glands, located in the scrotum, where sperm and hormones are produced.

Urethra—Refers to the opening at the end of the penis; drains urine from the bladder.

Vas deferens—The duct that stores sperm and carries it from the testicles to the urethra.

- infection of the bladder, kidney, prostate, or urinary tract
- other recent illness
- narrowing of the urethra (the tube that drains urine from the bladder)
- use of a urethral catheter

The infection does not start in the epididymis. It is an ascending infection that most often starts in the urethra or urinary tract before spreading to the epididymis.

Causes and symptoms

Among men under age 35 who are sexually active, *Chlamydia trachomatis* or *Neisseria gonorrhoeae* are the most common causes of epididymitis.

Nonsexually transmitted epididymitis is associated with urinary tract infections and is more common in men who have undergone surgery for urinary tract problems or who have anatomical abnormalities.

Although epididymitis is often caused by and associated with some of the same organisms that cause some sexually transmitted diseases, there are other causes as well. The condition can also be attributed to pus-generating bacteria associated with infections in other parts of the body. This cause, however, is rare.

Epididymitis can be caused by injury or infection of the scrotum or by irritation from urine that has accumulated in the vas deferens (the duct through which sperm travels after leaving the epididymis).

Epididymitis is characterized by pain in the testes. The pain, which usually develops gradually over several hours or days, is followed by sudden redness and swelling of the scrotum. Generally, only one testicle is affected. The affected testicle is hard and sore, and the other testicle may feel tender. The patient has **chills**, a low-grade **fever** and usually has acute urethritis (inflammation of the urethra).

Sometimes, there is a discharge from the urethra and blood in the semen. Ejaculation can be painful.

Enlarged lymph nodes in the groin cause scrotal pain that intensifies throughout the day and may become so severe that walking normally becomes impossible.

Diagnosis

Doctors test for epididymitis through:

- Urinalysis, which will likely show an elevated white blood-cell count and the presence of bacteria.
- Urine culture, to identify the organism responsible for the infection.
- Examination of discharges from the urethra and prostate gland.
- Blood tests to measure white-cell counts, which will be elevated.
- Ultrasound, which will reveal an enlarged epididymis.

The condition may lead to an **abscess** or cause such complications as **infertility**, so it is best to consult a urologist about the condition and treatment.

Treatment

Conventional treatment involves the use of antibiotics to treat the infection and pain killers to ease the pain. With alternative therapies, the treatment involves increasing circulation to the area. This reduces inflammation, which helps the body heal.

Fasting is recommended for some people, since digestion slows down the body's healing mechanisms. A water fast is best, but if that is not possible, the patient should confine intake to fruit and vegetable juices. If food must be eaten, a light diet of fresh fruits and vegetables is recommended. Fasting eases pain. Fluids should also be increased.

In **traditional Chinese medicine**, there are formulas of herbs that need to be designed to fit the individual case. Herbs like philodendron (Huang Bai) are used for inflammation in the lower torso area. **Pulsatilla**, which helps with swelling and pain, particularly in the genitals, and podophyllum are the most effective in treating epididymitis. These plants, however, are toxic, and the herb should only be taken under the direct supervision of an experienced herbalist. **Echinacea**, **horsetail**, **saw palmetto** berries, **cranberry** extract, and chimaphilla are also effective.

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Hydrotherapy may also help. Sitting in hot water increases circulation to the prostate area, alleviating discomfort and speeding recovery. Patients are advised to sit in a tub for 15 to 30 minutes once or twice a day. The water should be as hot as can be tolerated.

Homeopathy is also an option. Homeopathic physicians may prescribe remedies that are specific to the person.

Since epididymitis is caused by an infection and often involves the urinary tract, the following alternative remedies may also be helpful in treatment of the condition:

- Acupuncture, which may help ward off another infection.
- Aromatherapy. A hot sitz bath with drops of juniper berry or sandalwood may relieve symptoms of the infection.
- Chiropractic. Strengthening bladder muscles by adjusting the joints and bones in the pelvic area may keep infection at bay.

Allopathic treatment

Epididymitis is traditionally treated with antibiotic therapy. To prevent reinfection, patients must take their medication exactly as prescribed, even if the patient's symptoms disappear or if he begins to feel better. Over-the-counter anti-inflammatories may be taken to relieve pain. The over-the-counter medicines will have the same effects as herbal anti-inflammatories.

Bed rest is recommended until symptoms subside, and patients are advised to wear athletic supporters when they resume normal activities. If pain is severe, a local anesthetic like lidocaine (Xylocaine) may be injected directly into the spermatic cord. Scrotal ice packs and scrotal elevation are also recommended.

Self-care

A patient who has epididymitis should not drink beverages that contain **caffeine**. To prevent **constipation**, he should use stool softeners or eat plenty of fruit, nuts, whole grain cereals, and other foods with laxative properties.

Strenuous activity should be avoided until symptoms disappear. Sexual activity should not be resumed until a month after symptoms disappear.

If a second course of treatment does not eradicate stubborn symptoms, long-term anti-inflammatory therapy may be recommended. In rare instances, chronic symptoms require surgery.

Surgery

There are two surgical procedures used to treat epididymitis, and both of them cause sterility.

Epididymectomy involves removing the inflamed section of the epididymitis through a small incision in the scrotum.

Bilateral vasectomy prevents fluid and sperm from passing through the epididymis. This procedure is usually performed on men who have chronic epididymitis or on elderly patients undergoing prostate surgery.

Before considering surgeries that will lead to infertility, patients may want to try alternative therapies.

Expected results

Herbal preparations are very effective in treating epididymitis. Some sources say that given in medicinal doses, the herbs pulsatilla and podophyllum can treat epididymitis with the same results as conventional medicine.

Pain may begin to subside within 24 hours of treatment, but complete healing may take weeks or even months.

Prevention

Using condoms and not having sex with anyone who has a sexually transmitted disease (STD) can prevent some cases of epididymitis. Also, drinking plenty of fluids, which will increase urine flow, will help prevent urine retention, which can lead to infection.

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Lisa Frick

Epilepsy

Definition

Epilepsy is a condition characterized by recurrent seizures that may include repetitive muscle jerking called convulsions. A seizure is a sudden disruption of the brain's normal electrical activity accompanied by altered consciousness and/or other neurological and behavioral manifestations.

Description

Epilepsy affects 2.7 million people in the United States. Although epilepsy is as common in adults over 60 as in children under 10, 25% of all cases develop before the age of five. One in every two cases develops before the age of 25. About 200,000 new cases of epilepsy are diagnosed each year, and a significant number of children and adults that have not been diagnosed or treated have epilepsy.

Most seizures are benign, but a seizure that lasts a long time can lead to status epilepticus, a life-threatening condition characterized by continuous seizures, sustained loss of consciousness, and respiratory distress. Nonconvulsive epilepsy can impair physical coordination, vision, and other senses. Undiagnosed seizures can lead to conditions that are more serious and more difficult to manage.

Types of seizures

Generalized epileptic seizures occur when electrical abnormalities exist throughout the brain. A partial seizure does not involve the entire brain. A partial seizure begins in an area called an epileptic focus, but it may spread to other parts of the brain and cause a generalized seizure. Some people who have epilepsy have more than one type of seizure.

Motor attacks cause parts of the body to jerk repeatedly. A motor attack usually lasts less than an hour and may last only a few minutes. Sensory seizures begin with numbness or tingling in one area. The sensation may move along one side of the body or the back before subsiding.

Visual seizures that affect the area of the brain that controls sight cause people to hallucinate. Auditory seizures affect the part of the brain that controls hearing and cause the patient to imagine hearing voices, music, and other sounds. Other types of seizures can cause confusion, upset stomach, or emotional distress.

PARTIAL SEIZURES. Simple partial seizures do not spread from the focal area from which they arise. Symptoms are determined by the part of the brain affected. The patient usually remains conscious during the seizure and can later describe it in detail.

COMPLEX PARTIAL SEIZURES. A distinctive smell, taste, or other unusual sensation (aura) may signal the start of a complex partial seizure.

Complex partial seizures start as simple partial seizures but move beyond the focal area and cause loss of consciousness. Complex partial seizures can become major motor seizures. Although individuals who are having a complex partial seizure may not seem to be unconscious, they do not know what is happening and may behave inappropriately. They do not remember the seizure but may seem confused or intoxicated for a few minutes after it ends.

Causes and symptoms

The origin of 50 to 70% of all cases of epilepsy is unknown. Epilepsy sometimes results from trauma at birth. Such causes include insufficient oxygen to the brain; head injury; heavy bleeding or incompatibility between a woman's blood and the blood of her newborn baby; and infection immediately before, after, or at the time of birth.

Other causes of epilepsy include:

- head trauma resulting from a car accident, gunshot wound, or other injury
- alcoholism
- brain abscess or inflammation of membranes covering the brain or spinal cord
- phenylketonuria (PKU), a disease that is present at birth, is often characterized by seizures and can result in mental retardation
- other inherited disorders
- infectious diseases such as measles, mumps, and diphtheria
- degenerative disease
- lead poisoning, mercury poisoning, carbon monoxide poisoning, or ingestion of some other poisonous substance
- genetic factors

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Status epilepticus, a condition in which a person suffers from continuous seizures and may have trouble breathing, can be caused by the following:

- suddenly discontinuing anti-seizure medication
- hypoxic or metabolic encephalopathy (a brain disease resulting from lack of oxygen or malfunctioning of other physical or chemical processes)
- acute head injury
- infection spread from blood (for example, meningitis or encephalitis) caused by inflammation of the brain or the membranes that cover it

Diagnosis

Personal and family medical history, description of seizure activity, and physical and neurological examinations help primary care physicians, neurologists, and epileptologists diagnose this disorder. Doctors rule out conditions that cause symptoms that resemble epilepsy, including small strokes (transient ischemic attacks, or TIAs), fainting (syncope), pseudoseizures, and sleep attacks (**narcolepsy**).

Neuropsychological testing uncovers learning or memory problems. Neuroimaging provides views of brain areas involved in seizure activity.

The electroencephalogram (EEG) is the main test used to diagnose epilepsy. EEGs use electrodes placed on or within the skull to record the brain's electrical activity and pinpoint the exact location of abnormal discharges.

Individuals may be asked to remain motionless during a short-term EEG or to go about their normal activities during extended monitoring. Some patients are deprived of sleep or exposed to seizure triggers, such as rapid, deep breathing (hyperventilation) or flashing lights (photic stimulation). In some cases, people may be hospitalized for EEG monitorings that can last as long as two weeks. Video EEGs also document what individuals were doing when the seizure occurred and how the seizure changed their behavior.

Other techniques used to diagnose epilepsy include:

- Magnetic resonance imaging (MRI), which provides clear, detailed images of the brain. Functional MRI (fMRI), performed while the patient does various tasks, can measure shifts in electrical intensity and blood flow and indicate which brain region each activity affects.
- Positron emission tomography (PET) and single photon emission tomography (SPECT) monitor blood flow and chemical activity in the brain area being tested. PET and SPECT are effective in locating the brain region in which metabolic changes take place between seizures.

Treatment

Relaxation techniques

Stress increases seizure activity in 30% of people who have epilepsy. **Relaxation** techniques can provide some sense of control over the disorder, but they should never be used instead of anti-seizure medication or without the approval of the patient's doctor. **Yoga**, **meditation**, and favorite pastimes help some people relax and manage stress more successfully. **Biofeedback** can teach adults and older adolescents how to recognize an aura and what to do to stop its spread. Children under 14 usually are not able to understand and apply principles of biofeedback.

Acupuncture

Acupuncture treatments (acupuncture needles inserted for a few minutes or left in place for as long as 30 minutes) make some people feel pleasantly relaxed.

Acupressure

Acupressure can have the same pleasantly relaxed effect on children or on adults who dislike needles.

Aromatherapy

Aromatherapy involves mixing aromatic plant oils into water or other oils and massaging them into the skin or using a special burner to waft their fragrance throughout the room. Aromatherapy oils affect the body and the brain, but undiluted oils should never be applied directly to the skin. Ylang ylang, **chamomile**, or **lavender** can create a soothing mood. People who have epilepsy should not use **rosemary**, **hyssop**, citrus (such as lemon), **sage**, or sweet **fennel**, which seem to stimulate the brain.

Nutritional therapy

KETOGENIC DIET. A special high-fat, low-protein, low-carbohydrate diet sometimes is used to treat patients whose severe seizures have not responded to other treatment. Calculated according to age, height, and weight, the ketogenic diet induces mild starvation and dehydration. This procedure forces the body to create an excessive supply of ketones, natural chemicals with seizure-suppressing properties.

The goal of this controversial approach is to maintain or improve seizure control while reducing

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medication. The ketogenic diet works best with children between the ages of one and 10. It is introduced over a period of several days, and most children are hospitalized during the early stages of treatment.

If a child following this diet remains seizure-free for at least six months, increased amounts of carbohydrates and protein gradually are added. If the child shows no improvement after three months, the diet gradually is discontinued. A 2003 study of the diet and its effect on growth noted that if the diet is used, clinicians should recommend adequate intake of energy foods and protein and a higher proportion of unsaturated to saturated dietary fats. The report also recommended use of vitamin and mineral supplements with the diet.

Introduced in the 1920s, the ketogenic diet had limited, short-term success in controlling seizure activity. Its use exposes patients to such potentially harmful side effects as the following:

- staphylococcal infections
- stunted or delayed growth
- low blood sugar (hypoglycemia)
- excess fat in the blood (hyperlipidemia)
- disease resulting from calcium deposits in the urinary tract (urolithiasis)
- disease of the optic nerve (optic neuropathy)

Homeopathy

Homeopathic therapy also can work for people with seizures, especially constitutional homeopathic treatment that acts at the deepest levels to address the needs of the individual person.

Allopathic treatment

The goal of epilepsy treatment is to eliminate seizures or make the symptoms less frequent and less severe. Long-term anticonvulsant drug therapy is the most common form of epilepsy treatment.

Medication

A combination of drugs may be needed to control some symptoms, but many patients who have epilepsy take one of the following medications:

- phenytoin (Dilantin)
- carbamazepine (Tegretol)
- phenobarbital (Barbita)
- primidone (Mysoline)
- valproic acid, sodium valproate (Depakene)
- clonazepam (Klonopin)
- ethosuximide (Zarontin)

Dilantin, Tegretol, Barbita, and Mysoline are used to manage or control generalized tonic-clonic and complex partial seizures. Depakene, Klonopin, and Zarontin are prescribed for patients who have absence seizures.

Neurontin, Lamictal, and Topamax are among medications approved in the United States to treat adults who have partial seizures or partial and grand mal seizures. Another medication, levetiracetam (Keppra), was approved and showed particularly good results in reducing partial seizures among elderly patients with few side effects. Having minimal side effects is important because elderly patients often have other conditions and must take other medications that might interact with seizure medications. In 2003, Keppra's manufacturer was working on a new anti-epilectic drug from the same chemical family as Keppra that was anticipated to be more potent and effective. That drug was in phase III trials as of 2008. Available medications frequently change, and the physician determines the best treatment for an individual patient. A 2003 report found that monotherapy (using just one medication rather than a combination) works better for most patients. The less complicated the treatment, the more likely the patient will comply and better manage the seizure disorder.

Even epileptic patients whose seizures are well controlled should have regular blood tests to measure levels of anti-seizure medication in their system and to check to see if the medication is causing any changes in blood or liver function. A doctor should be notified if any signs of drug toxicity appear, including uncontrolled eye movements; sluggishness, **dizziness**, or hyperactivity; inability to see clearly or speak distinctly; **nausea** or **vomiting**; or sleep problems.

Status epilepticus requires emergency treatment, usually with Valium, Ativan, Dilantin, or Barbita. An intravenous dextrose (sugar) solution is given to patients whose condition is due to low blood sugar, and a vitamin B_1 preparation is administered intravenously when status epilepticus results from chronic alcohol withdrawal. Because dextrose and **thiamine** are essentially harmless and because delay in treatment can be disastrous, these medications are given routinely, as it is typically difficult to obtain an adequate history from a patient suffering from status epilepticus.

Intractable seizures are seizures that cannot be controlled with medication or without sedation or other unacceptable side effects. Surgery may be used to eliminate or control intractable seizures.

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Surgery

Surgery can be used to treat patients whose intractable seizures stem from small focal lesions that can be removed without endangering the patient, changing the patient's personality, dulling the patient's senses, or reducing the patient's ability to function.

A physical examination is conducted to verify that a patient's seizures are caused by epilepsy, and surgery is not used to treat patients with severe psychiatric disturbances or medical problems that raise risk factors to unacceptable levels.

Surgery is never recommended unless the following have occurred:

- The best available anti-seizure medications have failed to control the patient's symptoms satisfactorily.
- The origin of the patient's seizures has been precisely located.
- There is good reason to believe that surgery will significantly improve the patient's health and quality of life.

Every patient considering epilepsy surgery is carefully evaluated by one or more neurologists, neurosurgeons, neuropsychologists, and/or social workers. A psychiatrist, chaplain, or other spiritual advisor may help the patient and his family cope with the stresses that occur during and after the selection process.

TYPES OF SURGERY. Surgical techniques used to treat intractable epilepsy include:

- Lesionectomy. Removing the lesion (diseased brain tissue) and some surrounding brain tissue is very effective in controlling seizures. Lesionectomy is generally more successful than surgery performed on patients whose seizures are not caused by clearly defined lesions, but removing only part of the lesion lessens the effectiveness of the procedure.
- Temporal resections. Removing part of the temporal lobe and the part of the brain associated with feelings, memory, and emotions (the hippocampus) provides good or excellent seizure control in 75 to 80% of properly selected patients with appropriate types of temporal lobe epilepsy. Some patients experience post-operative speech and memory problems.
- Extra-temporal resection. This procedure involves removing some or all of the frontal lobe, the part of the brain directly behind the forehead. The frontal lobe helps regulate movement, planning, judgment, and personality. Special care must be taken to prevent post-operative problems with movement and speech. Extra-temporal resection is most successful in patients whose seizures are not widespread.
- Hemispherectomy. This method of removing brain tissue is restricted to patients with severe epilepsy and abnormal discharges that often extend from one side of the brain to the other. Hemispherectomies are most often performed on infants or young children who have had an extensive brain disease or disorder since birth or from a very young age.
- Corpus callosotomy. This procedure, an alternative to hemispherectomy in patients with congenital hemiplegia, removes some or all of the white matter that separates the two halves of the brain. Corpus callosotomy is performed almost exclusively on children who are frequently injured during falls caused by seizures. If removing two-thirds of the corpus callosum does not produce lasting improvement in the patient's condition, the remaining one-third is removed during another operation.
- Multiple subpial transection. This procedure is used to control the spread of seizures that originate in or affect the so-called eloquent cortex, the area of the brain responsible for complex thought and reasoning.

Other forms of treatment

VAGUS NERVE STIMULATION. Approved for adults and adolescents (over 16 years old) with intractable seizures, vagus nerve stimulation (VNS) uses a pacemaker-like device implanted under the skin in the upper left chest, to provide intermittent stimulation to the vagus nerve. Stretching from the side of the neck into the brain, the vagus nerve affects swallowing, speech, breathing, and many other functions, and VNS may prevent or shorten some seizures.

First aid for seizures

A person with epilepsy having a seizure should not be restrained, but sharp or dangerous objects should be moved out of reach. Anyone having a complex partial seizure can be warned away from danger by someone calling his/her name in a clear, calm voice.

A person with epilepsy having a grand mal seizure should be helped to lie down, and those aiding the patient should contact emergency medical personnel. Tight clothing should be loosened. A soft, flat object like a towel or the palm of a hand should be placed under the person's head. Forcing a hard object into the mouth of someone having a grand mal seizure could cause injuries or breathing problems. If the person's mouth is open, placing a folded cloth or other soft object between his or her teeth will protect the tongue. Turning the patient's head to the side will help with breathing. After a grand mal seizure has ended, the person who had the seizure should be told what has happened and reminded of where he or she is.

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KEY TERMS

Acupressure—Needleless acupuncture.

Acupuncture—An ancient Chinese method of relieving pain or treating illness by piercing specific areas of the body with fine needles.

Biofeedback—A learning technique that helps individuals influence automatic body functions.

Epileptologist—A physician who specializes in the treatment of epilepsy.

Expected results

People who have epilepsy have a higher than average rate of suicide; sudden, unexplained death; and drowning and other accidental fatalities.

Benign focal epilepsy of childhood and some absence seizures may disappear in time, but remission is unlikely if seizures occur several times a day, several times in a 48-hour period, or more frequently than in the past.

Epilepsy can be partially or completely controlled if the individual takes anti-seizure medication according to directions; avoids seizure-inducing sights, sounds, and other triggers; gets enough sleep; and eats regular, balanced meals.

Individuals who have epilepsy should wear a bracelet or necklace identifying the seizure disorder and listing the medication they take.

Prevention

Eating properly, getting enough sleep, and controlling stress and fevers can help prevent seizures. A person who has epilepsy should be careful not to hyperventilate. Those who experience auras should find a safe place to lie down and stay until the seizure passes. Anticonvulsant medications should not be stopped suddenly, and if other medications are prescribed or discontinued, the doctor treating the seizures should be notified. In some conditions, such as severe head injury, brain surgery, or subarachnoid hemorrhage, anticonvulsant medications may be given to the patient to prevent seizures.

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ORGANIZATIONS

American Epilepsy Society, 342 N. Main St., Rm. 301, Hartford, CT 06105-4298, (860) 586-7505, http://www.aesnet.org/.

Epilepsy Foundation, 8301 Professional Place, Landover, MD 20785, (800) 332-1000, http://www.epilepsyfoundation.org/.

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Epimedium

Description

Epimedium is a genus of 21 species and is a member of the buttercup family. *Epimedium* is a woody, pungent ornamental herb found in western and eastern Asia and the Mediterranean. Various hybrids are grown elsewhere and most often are used as groundcover, particularly in shady areas. The herb also goes by the name

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Epimedium is a woody, pungent ornamental herb found in western and eastern Asia and the Mediterranean. *(© Frank Blackburn / Alamy)*

KEY TERMS

Expectorant—A preparation that loosens or liquefies thick mucus.

Impotence—Refers to a condition where the penis is unable to get erect or stay erect.

Shen Nong—A legendary emperor, he was called the "Divine Farmer" of China. Shen Nong made many discoveries concerning herbal medicine and cataloged 365 species of medicinal plants. An early herbal text, written around 400 A.D., was named after him.

Sinusitis—An infection of the sinus cavities characterized by pain in the eyes and cheeks, fever, and difficulty breathing through the nose.

Suet—Refers to the hard fat found around cattle and sheep kidneys and loins; it is used in cooking.

horny goat weed and barrenwort. The Chinese call it *Yin Yang Huo*, which means "licentious goat plant."

The plant was named epimedium because it is akin to a plant found in the ancient southwest Asian kingdom of Media, now a part of Iran. Plants used for medicinal purposes include *Epimedium sagittatum*, *Epimedium brevicornum*, *Epimedium wushanense*, *Epimedium koreanum*, and *Epimedium pubescens*.

General use

The use of epimedium as a medicinal herb dates back thousands of years. Shen Nong's *Canon of Medicinal Herbs*, compiled around 400 A.D., mentions its use.

The odorless, bitter herb has been used as a:

- Kidney tonic to help relieve problems of frequent urination and correct problems of lightheadedness and weakness associated with improper body fluid volumes.
- Reproductive system tonic to treat impotence and premature ejaculation.
- Rejuvenating tonic, as an aphrodisiac or to relieve fatigue.

The herb, which dilates blood vessels, has also been used to treat coronary **heart disease**, **asthma**, **bronchitis**, and sinusitis. An expectorant, it can be used to control coughing. It can also be used to lower blood pressure.

Studies have shown that epimedium raises adrenaline, noradrenaline, serotonin, and dopamine levels in animals. It is the dopamine that may be responsible for the herb's use as a reproductive tonic. The increased dopamine levels in the body set off a chain reaction that leads to a release of testosterone, the male sex hormone.

Other evidence suggests the herb increases sensitivity in nerve endings, which may explain why it is prescribed as an aphrodisiac.

Preparations

The herb is collected in summer or early autumn, then dried in the sun. Some use it unprepared, while others bake it with sheep fat.

The herb can be ingested as a tea infusion. To make the tea, 1 oz (28 g) of the cut leaves are added to a pint of hot water. The recommended dosage is one to three cups per day. The tea should be taken with food.

A powder form may be made by combining 100 kg of dried epimedium leaves with 20 kg of refined suet, then stir-frying the concoction.

Epimedium may also be combined with **lycium fruit** to make a tea concoction to stimulate the Kidneys and reproductive system. Combine one ounce of epimedium and wolfberries (lycium) with hot water and drink after the concoction has steeped for 10 to 15 minutes. Note that individuals with **allergies** to

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tomatoes and other vegetables in the nightshade family may also be allergic to lycium berries.

Precautions

When buying epimedium, be sure to pick leaves with a dark color. Those that are yellow or blanched probably sat in the sun too long when drying and will not be as effective.

Also, purchase herbs from reputable companies to ensure their purity.

Side effects

Ingesting an excess amount of the herb can lead to **vomiting**, **dizziness**, thirst, and nosebleed.

Interactions

Just like other drugs, herbs can be hazardous to health both by themselves and particularly in certain combinations. For this reason, consult a knowledgeable herbal therapist before taking epimedium to find out what it can and cannot be used with. Also, be aware that herbs can interfere with prescription medication.

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Lisa Frick

Erectile dysfunction *see* **Impotence**

Escharotic treatment

Description

Escharotic treatment is the use of topical herbal preparations to treat a variety of cancerous lesions. Escharotic treatments are highly corrosive and produce a thick crust (eschar) that results in extensive scarring.

General use

Escharotic treatments have been used for hundreds of years. During the late twentieth century, these agents were used for the self-treatment of basal cell, squamous cell, and melanoma skin cancers, as well as cervical **cancer**, among others.

Many components of escharotic treatments have been identified as having antioxidant, antimitotic (inhibit cell division), and other anticarcinogenic properties. Escharotic agents may have beneficial properties when used by trained, licensed medical professionals for specific applications, including debridement of chronic leg ulcers and chemosurgical debridement of bone cancers.

Frederic Mohs developed the micrographic fixed-tissue staged excision procedure of his namesake in the 1930s. For this procedure, he used the escharotic agent **zinc** chloride (later coined "Mohs paste"). The Mohs procedure in the 2000s does not involve the use of zinc chloride because the cure rate and tissue conservation associated with this procedure are related to surgical technique and not to the use of the escharotic agent. The Mohs procedure involves the surgical removal of the visible tumor, followed by microscopic examination of the removed tissue. If cancer is seen at the margins, the suspected area plus a thin margin are removed, and this process is repeated until all of the cancer appears to have been identified and removed. This procedure is associated with a very high cure rate, reduced scarring, and minimal removal of healthy tissue.

There is very little evidence-based clinical research to support the benefits of these remedies when used for other applications, especially when they are used by consumers as self-treatment in lieu of recommended conventional therapies. There have been numerous reports of adverse effects associated with the use of these products. Several case studies have reported that tumors are not reliably treated with escharotic treatments, result in extensive scarring that is often unsightly, and have been associated with tumor recurrence within the scar tissue.

Escharotic products that contain labeling or marketing statements claiming that they treat cancers cannot legally be marketed in the United States. However, the distribution of escharotic substances grew considerably in the United States between 1998 and 2008 via unregulated Internet direct-to-consumer sales. As a result, many patients who have sought alternative remedies instead of more conventional treatments have experienced serious side effects.

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The U.S. Federal Trade Commission (FTC), the U.S. Food and Drug Administration (FDA), and Health Canada (the Canadian federal health department), created a law enforcement and consumer education campaign in 1999 called Operation Cure All, in order to teach consumers how to identify health fraud and to provide information for businesses about truthful marketing practices for health products.

Research is ongoing to determine how escharotic treatments alter certain diseases or reduce the risk of diseases and how they can be used effectively while minimizing side effects. In addition, labeling terminology, including product health claims, are still being determined for escharotic agents.

Preparations

Escharotic treatments are available in salve, paste, poultice, or plaster preparations. The recommended use is to apply a liberal amount over the lesion or affected area and leave it on the skin for a long period of time, up to 24 hours.

The most caustic escharotic treatments, sometimes referred to as "black salves " include:

- bloodroot *(Sanguinaria canadendid)*
- zinc chloride
- goldenseal *(Hydrastis canadensis)*

Other herbal preparations used as escharotic treatments include:

- red clover *(Trifolium pretense)*
- combination preparations containing red clover, bloodroot, galangal, and sheep sorrel (*Rumex acetosella*, also known as sour grass)
- carbamide (urea)
- graviola leaf *(Annona muricata)*

Precautions

Escharotic agents are not recommended for self-treatment applications because of the associated risk of serious side effects, which have been well-documented. Escharotic treatments do not completely remove tumors, they may damage surrounding healthy tissue, and they may result in significant scarring with poor cosmetic outcomes.

The FDA has banned black salve products, including all products containing *Cansema*, as well as **bloodroot** paste *Sanguinaria canadensis* due to their harmful effects.

In the United States, herbal supplements are not required to be standardized. Although regulated under the 1994 Dietary Supplement Health and Education Act (DSHEA), there are no safety reviews or approved therapeutic uses for escharotic treatments by the FDA. After the product is marketed, the FDA must prove the product unsafe before it can be removed from the shelves. Fortunately, several escharotic treatments have been proven unsafe and removed from the market, although there are many harmful products still available.

Manufacturing guidelines for herbal remedies are not standardized; therefore, preparations can vary widely from one brand to another and within the same brand from one purchase to the next, making inconsistency in the concentration of ingredients a potential risk.

Many people associate the term "natural" with "safe" and that is not always the case. Anyone taking herbal products of any kind should be certain to read labels carefully and discuss the products with a physician to evaluate potential interactions with other medical conditions and/or prescription medications.

Side effects

Escharotic treatments can result in large open sores or lesions that often spread well beyond the

KEY TERMS

Antioxidant—A substance that protects against the oxidative processes that may lead to cellular damage. Antioxidants are associated with a reduced risk of cancer, cardiovascular disease, and other medical conditions.

Caustic—Corrosive; capable of destroying by chemical action.

Epithelial—Tissues that line cavities and body surfaces, such as the skin.

Mohs surgery—A type of micrographic surgery for removal of a visible tumor. Mohs surgery has a high cure rate (up to 99% for certain types of new lesions and 95% for recurrent cancers), with minimal removal of healthy surrounding tissue.

Paste—Water-based products that are thick when applied and have a tendency to dry out and build up.

Poultice—A soft mass that is usually heated, spread on a cloth, and applied to sores or other lesions.

Salve—A substance that is applied to wounds or sores.

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margins of the original tumor or lesion. These agents do not completely remove tumors; they damage surrounding healthy tissue, and they result in significant scarring with poor cosmetic outcomes.

Interactions

Serious side effects have occurred with the use of bloodroot paste (*Sanguinaria canadendid*) and zinc chloride combination as part of the Mohs chemosurgery fixed-tissue technique.

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OTHER

Operation Cure.All. http://www.ftc.gov/cureall.

ORGANIZATIONS

Alternative Medicine Foundation, PO Box 60016, Potomac, MD 20859, (301) 340-1960, http://www.amfoundation.org.

National Center for Complementary and Alternative Medicine, National Institutes of Health, 9000 Rockville Pike, Bethesda, MD 20892, (888) 644-6226, http://www.nccam.nih.gov.

Angela M. Costello

Essential fatty acids

Description

Essential fatty acids (EFAs) are fats that are essential to the diet because the body cannot produce them. Essential fatty acids are extremely important nutrients for health. They are present in every healthy cell in the body and are critical for the normal growth and functioning of the cells, muscles, nerves, and organs. EFAs are also used by the body to produce a class of hormone-like substances called prostaglandins, which are key to many important processes. Deficiencies of EFAs are linked to a variety of health problems, including major ones such as **heart disease**, **cancer**, and diabetes. It has been estimated that as many as 80% of Americans may consume insufficient quantities of EFAs.

Very few health issues received as much attention during the last third of the twentieth century as the question of fat in the diet. Sixty-eight percent of deaths in the United States are related to fat consumption and diet, including heart disease (44% of deaths), cancer (22%) and diabetes (2%). There are several types of dietary fats. Saturated fat is found mainly in animal products, including meat and dairy products, avocados, and nuts. **Cholesterol** is a dietary fat that is only found in animal products. Cholesterol is also made by the body in small amounts from saturated fats. Heavy consumption of saturated fat and cholesterol has been linked to heart disease and cancer. Unsaturated fats are typically oils from vegetables and nuts and are present in some fish. These are considered the healthiest dietary fats. Essential fatty acids are unsaturated fats. EFAs are the only fats that may need to be increased in the U.S. diet.

Scientists classify essential fatty acids in two types, **omega-3 fatty acids** and **omega-6 fatty acids**, depending on their chemical composition. Technically, the omega-3 fatty acids are alpha-linolenic acid, stearidonic acid, and two others called EPA and DHA. Alpha-linolenic acid is found mainly in **flaxseed** oil, canola oil, soybeans, walnuts, hemp seeds, and dark green leafy vegetables. Stearidonic acid is found in rarer types of seeds and nuts, including black currant seeds. EPA and DHA are present in cold-water fish, including salmon, trout, sardines, mackerel, and cod. Cod liver oil is a popular nutritional supplement for omega-3 EFAs.

Omega-6 fatty acids are more common in the U.S. diet than the omega-3 EFAs. These include **linoleic acid**, which is found in safflower, olive, almond, sunflower, hemp, soybean, walnut, pumpkin, sesame, and flaxseed oils. Gamma-linolenic acid (GLA) is found in some seeds and evening primrose oil. Arachidonic acid (AA) is present in meat and animal products.

Both types of EFAs, omega-3 and omega-6 fatty acids, are necessary in a healthy diet. Deficiencies of EFAs have been brought about by changes in diet and

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the modern processing of foods and oils. Many nutritionists believe that a major dietary problem is the use of hydrogenated oils, which are present in margarine and many processed foods. Hydrogenated oils are highly refined by industrial processes and contain toxic by-products and trans-fatty acids. Trans-fatty acids are fat molecules with chemically altered structures and are believed to have several detrimental effects on the body. Trans-fatty acids interfere with the absorption of healthy EFAs and may contribute to **atherosclerosis** or damage to the arteries. Deep-fried foods, which are cooked in oil that is altered by very high temperatures, also contain trans-fatty acids. Many health professionals, including those at the World Heath Organization, have protested against the use of hydrogenated oils in food and the consumption of trans-fatty acids. Health conditions linked to the consumption of trans-fatty acids and hydrogenated oils include cancer, heart disease, high cholesterol, diabetes, **obesity**, immune system disorders, decreased sperm counts, and infant development problems.

Dietary changes that have contributed to EFA deficiency or imbalances include the increased use of oils that contain few or no omega-3 EFAs; the industrial milling of flour that removes the EFA-containing germ; the increase of sugar and fried foods in the diet that may interfere with the body's absorption of EFAs; and the decreased consumption of fish.

A balance of omega-3 and omega-6 EFAs in the diet is recommended by experts. Americans typically consume higher quantities of omega-6 EFAs because these are found in meat, animal products, and common cooking oils. Research has shown that too many omega-6 EFAs in the diet can lead to the imbalanced production of prostaglandins, which may contribute to health problems. Experts recommend that omega-3 and omega-6 EFAs be present in the diet in a ratio of around one to three. Americans consume a ratio as high as one to 40. Thus, the need for greater amounts of omega-3 EFAs in the diet has increased.

Symptoms of EFA deficiency or imbalance include dry or scaly skin, excessively dry hair, cracked fingernails, **fatigue**, weakness, frequent **infections**, **allergies**, mood disorders, hyperactivity, **depression**, memory and learning problems, slow wound healing, aching joints, poor digestion, high blood pressure, obesity, and high cholesterol.

General use

EFA supplementation is recommended for more than 60 health conditions. EFAs are used therapeutically to treat and prevent cardiovascular problems, including heart disease, high cholesterol, strokes, and high blood pressure. EFAs also have anti-inflammatory effects in the body and are used in the nutritional treatment of arthritis, **asthma**, allergies, and skin conditions (e.g., **eczema**). EFAs are used as support for immune system disorders, including **AIDS**, **multiple sclerosis**, and lupus. EFAs have been thought to reduce the risk of cancer, but this assumption came under question in 2006 when an analysis of previous studies, called a meta-analysis, found mixed results. The study concluded that there is not enough evidence to suggest a significant relationship between consumption of omega-3 fatty acids and a reduced risk of cancer. Meta-analyses became fashionable topics in major medical journals in the late 1990s and 2000s, mainly because they are easy to conduct, require no new research, and are relatively inexpensive. However, many researchers point out that the findings of meta-analysis studies can be biased, depending on what criteria are used in selecting previous studies to be included in the meta-analysis. This criticism has been leveled at the 2006 study of omega-3 and cancer. In the August-September issue of *Townsend Letter: The Examiner of Alternative Medicine*, Melvyn R. Werbach wrote: "Not only are there numerous problems with the selection of studies for this meta-analysis, but the lack of consistently positive findings was not a basis for reaching such a negative conclusion." Werbach added that further research is needed to prove the positive effects of EFAs in fighting cancer as well as in establishing the correct dosages required. With the ratio of omega-3 to omega-6 fatty acids widening, Werbach suggests this imbalance may be contributing to rising cancer rates and that an increase in the dietary intake of omega-3 fatty acids should reduce the risk of cancer.

Other conditions that may improve with EFA supplementation include **acne** and other skin problems, depression, menopausal problems, nervous conditions, obesity, memory and learning disabilities, eye problems, and digestive disorders. A 2007 University of Colorado study found that a diet rich in omega-3 fatty acids might delay the onset of type 1 diabetes in children at risk for the disease. EFAs are recommended for weight loss programs, as they may assist fat metabolism in the body. In 2007, two studies reported that **diets** high in omega-3 fatty acids could be helpful in treating several psychiatric disorders. An Australian study found that children with early signs of psychosis who were given omega-3 supplements were six times less likely to develop a psychotic disorder than those who did not take a supplement. The second study, a meta-analysis done by U.S. researchers, reported that omega-3 fatty acid supplements

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were effective in treating borderline personality disorder (BPD). BPD occurs primarily in women and symptoms include a lack of self-sense, chaotic relationships with other people, depression, impulsive aggression, and unstable personality traits.

Preparations

Common EFA supplements are flaxseed oil, **evening primrose oil**, **borage oil**, **black currant seed oil**, hemp seed oil, and cod liver oil. Consumers should search for supplements that contain both omega-3 and omega-6 EFAs because imbalances of EFAs may occur if either is taken in excess over long periods of time. Flaxseed oil is a recommended supplement because it contains the highest percentage of omega-3 fatty acids with some omega-6 EFAs as well. Flaxseed oil is generally the least expensive source of omega-3 EFAs as well, generally much cheaper than **fish oil** supplements. Evening primrose oil is a popular supplement as well because the GLA it contains has shown benefits in treating **premenstrual syndrome** and other conditions. However, evening primrose oil contains no omega-3 EFAs. Hemp seed oil is a well-balanced source of both EFAs.

Supplements are available from health food stores in liquid and capsule form. The recommended daily dosage is one to two tablespoons (13-26 capsules), taken with meals. EFAs can also be obtained from a diet that includes cold-water fish consumed twice per week, whole grains, dark green leafy vegetables, walnuts, pumpkin seeds, **wheat germ**, soy products, canola oil, and other foods. Whole flaxseeds are a wholesome source of EFAs as well and can be freshly ground and added to salads and other dishes. Supplements that contain the enzyme **lipase** help the body more efficiently digest the oils.

In 2007, *USA Today* named omega-3 fatty acids one of the hottest food additives of 2007 because an increasing number of food manufacturers add omega-3 fatty acids to a wide range of food products, including milk, soy milk, yogurt, flax oil, canola oil, butter-like spreads, mayonnaise, and even microwavable popcorn. The reason is that dozens of studies conducted between 2000 and 2007 in the United States, Britain, Australia, Italy, and elsewhere showed that a diet high in omega-3 fatty acids significantly reduces the risk of heart disease.

Precautions

EFA supplements are generally fragile products and must be produced, packaged, and handled properly. Consumers should search for quality EFA supplements produced by reputable manufacturers. Products that are organically grown and certified by a third party are recommended. EFA products should be produced by cold or modified expeller pressing, which means that they were produced without damaging temperatures or pressure. Products should be packaged in light-resistant containers because sunlight damages EFAs. Packages should include manufacturing and expiration dates, in order to assure freshness. Stores and consumers should keep EFA products under refrigeration because heat damages them. Taste can indicate the quality of EFA oils: those that have no flavor usually are overly refined, and those that taste bitter are old or spoiled. Because of their low temperature threshold, nearly all oils that are used as EFA supplements are not suitable for use as cooking oils.

The U.S. Food and Drug Administration (FDA) cautions pregnant and nursing women and parents of infants and toddlers about the potential dangers of exposure to mercury from fish rich in omega-3 fatty acids and from fish oil capsules. High levels of mercury can affect brain development in fetuses and young children. The FDA recommends that these groups instead opt for younger species of fish such as canned tuna or farm-raised fish and skip fish oil capsules altogether. Vegetarians can supplement their diets with foods high in alpha-linoleic acids, including certain oils, flaxseed, and walnuts.

Side effects

Side effects with most EFA supplements are rare because EFAs are nontoxic and are used by the body as energy when taken in excess. The exception is cod liver and fish oil supplements, which can cause **vitamin A** and D toxicity when taken in excess. Side effects of vitamin A and D toxicity include headaches, skin discoloration, fatigue, **nausea**, and gastrointestinal problems. Fish oil supplements that have vitamins A and D removed are available.

Interactions

To maximize the benefits of EFA supplements, several recommendations can be followed. EFA users should reduce the amount of fat, particularly saturated fat from animal products, in their diet. The American Heart Association recommends that a healthy diet contains 30% or less of its total calories from fat. For 2,000 total calories per day, 600 calories or less should be from fat, including EFA supplements. Consumers should also completely eliminate hydrogenated and partially hydrogenated oils from their diets, which includes eliminating all processed foods that contain them, such as margarine and many packaged foods. Other foods that contain

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KEY TERMS

Atherosclerosis—Hardening of the arteries.

Cholesterol—A steroid fat found in food derived from animals that is also produced in the body for several important functions. Excess cholesterol intake is linked to many diseases.

Hydrogenated fat—Unsaturated fat, commonly vegetable oil, that is processed with high heat and hydrogen to make it solid at room temperature. Margarine is a common hydrogenated fat.

Trans-fatty acid—A toxic type of fat created by hydrogenating oils and by deep frying foods.

trans-fatty acids, such as deep fried foods, should also be eliminated. Recommended cooking oils are olive, safflower, canola, and sesame oils. EFA effectiveness may be increased by lowering the intake of sugar and alcohol in the diet. Nutrients that assist EFA uptake are the B-complex vitamins, **vitamin C**, **zinc**, and **magnesium**. As with any supplement, EFA effectiveness can be augmented with a nutritious, high fiber diet that emphasizes fresh and natural foods, and the intake of fish two times a week.

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ORGANIZATIONS

American Dietetic Association, 120 S. Riverside Plaza, Suite 2000, Chicago, IL 60606, (800) 877-1600, http://www.eatright.org.

Dieticians of Canada, 480 University Ave., Suite 604, Toronto, ON, M5G 1V2, Canada, (416) 596-0857, http://www.dieticians.ca.

National Center for Complementary and Alternative Medicine, 900 Rockville Pike, Bethesda, MD 20892, (888) 644-6226, http://www.nccam.nih.gov.

Office of Dietary Supplements, National Institutes of Health, 6100 Executive Blvd., Room 3B01, MSC 7517, Bethesda, MD 20892, (301) 435-2920, http://www.ods.od.nih.gov.

Douglas Dupler
Ken R. Wells

Essential oils

Description

Essential oils are fragrant oils present in many plants. Hundreds of plants yield essential oils that are used as perfumes, food flavorings, medicines, and as fragrant and antiseptic additives in many common products.

Essential oils have been used for thousands of years. The ancient civilizations of Mesopotamia, more than 5,000 years ago, had machines for obtaining essential oils from plants. Essential oils were the primary source of perfumes for the ancient civilizations of Egypt, India, Greece, and Rome. Essential oils have been found in 3,000-year-old tombs in the Pyramids. Early Greek physicians, including Hippocrates, mentioned aromatic plant essences and oil massages for their healing and mood-enhancing qualities. The Romans associated essential oils and their fine aromas with wealth and success. **Ayurvedic medicine**, the world's oldest healing system, has long recommended essential oil massage as a health treatment for many conditions.

In modern times, essential oils have been used in the manufacture of high quality perfumes, as additives in many common products, and in the healing practice of **aromatherapy**. Aromatherapy was begun in the 1920s by a French chemist named Réné-Maurice Gattefosse, who became convinced of the healing powers of essential oils when he used **lavender** oil to

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effectively heal a severe burn on his body. Gattefosse also discovered that essential oils could be absorbed into the bloodstream when applied to the skin and had medicinal effects inside the body. Another Frenchman, Jean Valnet, used essential oils during World War II to treat soldiers' **wounds** and wrote a major book on the topic in 1964 titled *Aromatherapie*. Another European biochemist, Marguerite Maury, performed thorough studies of how essential oils influence the body and emotions and popularized essential oil massages as therapy. During the 1990s, aromatherapy was one of the fastest growing alternative health treatments.

Essential oils are produced in several ways. Distillation uses water and steam to remove the oils from dried or fresh plants, and the expression method uses machines to squeeze the oil out of plants. Other techniques may use alcohol or solvents to remove essential oils from plant materials.

Essential oils are extremely concentrated. It would take roughly thirty cups of herbal tea to equal the concentration of plant essence in one drop of essential oil. Some essential oils made from rose plants require 4,000 lbs (1,814 kg) of rose petals to make 1 lb (0.5 kg) of essential oil and are thus very expensive. Lavender is one of the easiest essential oils to produce because it takes only 100 lbs (45 kg) of plant material to produce 1 lb (0.5 kg) of essential oil. Essential oils are generally very complex chemically, containing many different substances. Some experts have theorized that essential oils are the lifeblood of a plant and contain compounds that the plant uses to fight **infections** and drive away germs and parasites. Scientific research has isolated hundreds of chemicals in essential oils and has shown many essential oils to have antibacterial, anti-fungal, and anti-parasitic properties. Some essential oils contain more than 200 identified chemical substances.

Although there are hundreds of essential oils used regularly in healing treatments and perfumes, some of the more commonly used essential oils are lavender, **chamomile**, **peppermint**, **tea tree oil**, **eucalyptus**, geranium, jasmine, rose, lemon, orange, **rosemary**, frankincense, and sandalwood.

General use

Essential oils are used in several healing systems, including aromatherapy, Ayurvedic medicine, and **massage therapy**. Essential oils are used for skin and scalp conditions, including **acne**, **athlete's foot**, **burns**, **cuts**, **dandruff**, **eczema**, insect **bites**, parasites, **sunburn**, **warts**, and wrinkles. They are recommended for muscle, joint, and circulation problems such as arthritis, high blood pressure, **cellulite**, aches and pains, and **varicose veins**. For respiratory problems and infections, various essential oils are prescribed for **allergies**, **asthma**, **earache**, sinus infections, congestion, and colds and flu. Essential oils are also used to improve digestion, promote hormonal balance, and tone the nervous system in conditions such as **anxiety**, **depression**, **sexual dysfunction**, and exhaustion.

Essential oils can be used as quick and effective mood enhancers, for increasing energy and alertness, reducing **stress**, and promoting **relaxation**. Essential oils can be used as perfumes and lotions and can be used as incense to improve the atmosphere in houses and offices.

Preparations

Essential oils work by entering the body in two ways, through the nose and through the skin. The nose is a powerful sense organ, and the sense of smell is connected directly to the limbic system of the brain, which helps control emotions, memory, and several bodily functions. Research has shown that aromas and the sense of smell influence memory recall, moods, and bodily responses such as heart rate, respiration, hormone levels, and stress reactions. Essential oils with their potent aromas can be used to enhance moods, promote relaxation, and increase energy levels.

Essential oils are also absorbed by the skin and act medicinally once they are absorbed into the body. For instance, eucalyptus oil, long used in common **cough** and cold remedies, can be rubbed on the chest to break up congestion and mucus inside the lungs. Some essential oils, such as tea tree oil, lavender, and **thyme**, have natural antiseptics in them and can be applied to cuts, burns, and sores to disinfect and promote healing.

Because essential oils are strong and concentrated, they should be diluted with *base oils* before rubbing them directly on the body. Base oils are gentle and inexpensive oils such as almond, jojoba, grapeseed, sunflower, and **sesame oil**. Mineral oil is not recommended as a base oil. Essential oils should be diluted to make up 1 to 3% of a base oil solution, which is one to three drops of essential oil per teaspoon of base oil. For larger quantities, 20 to 60 drops can be added per 100 milliliters of base oil. Only a few essential oils can be rubbed directly on the skin without dilution. These are lavender, tea tree oil, eucalyptus, and geranium, although people with sensitive skin should use these oils with care.

Allergic reactions are possible with essential oils. People with sensitive skin or allergies should perform a

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simple skin test when using essential oils for the first time. To do a skin test, one drop of essential oil can be added to a teaspoon of base oil, and a small amount of this solution can be rubbed on a sensitive spot on the skin, such as the soft side of the arm or behind the ear. If no irritation occurs after 24 hours, then the essential oil is non-allergenic.

Essential oils can be used in a variety of ways. They can be added to massage oils for therapeutic massages. Essential oil solutions can be used on the skin, scalp, and hair as lotions, conditioners, and perfumes. A few drops of essential oils can be added to bath water or used in the sauna. Essential oil diffusers, lamps, and candles are available that use heat and steam to spread (diffuse) the aroma of essential oils in rooms. Essential oils can be added to hot-and-cold compresses for injuries and aches. Some essential oils, such as tea tree, **fennel**, and peppermint oil, can be combined with a mixture of water and **apple cider vinegar** and used as mouthwash. For colds and congestion in the lungs or sinuses essential oils can be inhaled by adding a few drops to a pot of boiling water, and covering the head with a towel over the pot and breathing the vapors.

Consumers should search for essential oils made by reputable manufacturers. Essential oils should be certified to be 100% pure, without chemical additives or synthetic fragrances. The highest quality oils are generally obtained from distillation and cold pressing methods.

Precautions

Essential oils should not be taken internally, by mouth, rectum, or vagina, unless under medical supervision. Essential oils should be kept away from the eyes. If an essential oil gets into the eyes, the eyes should be rinsed immediately with cold water. Essential oils should be used with care on broken or damaged skin.

Some essential oils had not been thoroughly tested as of 2008 and may be toxic. The oils to be avoided include **arnica**, bitter almond, calamus, cinnamon, clove, **mugwort**, **sage**, **wintergreen**, and **wormwood**. Pregnant women should avoid these oils as well as oils of basil, fennel, marjoram, **myrrh**, oregano, star **anise**, and tarragon. In general, those essential oils that have not been tested or for which adequate information is not available should be avoided.

Some essential oils may cause the skin to become photosensitive, or more sensitive to sunlight and more likely to become sunburned. Essential oils that are photosensitizing include bergamot, orange, lemon, lime, grapefruit, and **angelica** root. These oils should be avoided before exposure to sunlight and ultraviolet light such as in tanning salons. People with sun-related skin problems should avoid these oils.

KEY TERMS

Aromatherapy—The use of essential oil aromas as health therapies.

Ayurvedic medicine—Healing system developed in ancient India and practiced around the world in the twenty-first century.

Homeopathic remedy—Medication prescribed by a homeopathic doctor.

Individuals with health conditions should use care with essential oils. Steam inhalation of essential oils is not recommended for people with asthma. The essential oils of rosemary, fennel, and sage should be avoided by those with **epilepsy**.

Pregnant and nursing women should use caution with essential oils because their skin and bodies are more sensitive, and some oils may cause adverse reactions. Essential oils should not be used during the first three months of **pregnancy**, and after that they should only be used when heavily diluted with base oils. Women with histories of miscarriage should not use essential oils during pregnancy at all. Pregnant women should perform skin tests before using essential oils. Essential oils are not recommended for nursing mothers.

Essential oils should be used with care on children. They are not recommended for children under one year of age and should be heavily diluted with base oils when used as a skin massage or lotion for children.

Essential oils should be stored out of the reach of children. Clean glass containers are the best storage vessels and should be dark in color to keep sunlight from damaging the oil. Some essential oils can damage wood, varnish, plastic and clothing, and should be handled with care.

Side effects

Most readily available essential oils are safe if used in small doses, and side effects are generally rare. Possible side effects include **rashes**, **itching**, and irritation on the skin. Allergic reactions include watery eyes, **sneezing**, and inflammation. Some essential oils may cause **nausea**, **dizziness**, or gastrointestinal discomfort when used in excess or by those with allergic reactions. Some essential oils, particularly those derived from citrus fruit plants, can cause increased sensitivity to sunlight and increased risk of sunburn.

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Interactions

Essential oils are not recommended for those taking homeopathic remedies, as essential oils are believed to interfere with their effectiveness. Essential oils are often blended together to enhance their healing effects, and mixtures can be tailored to individual preferences and conditions. Aromatherapists specialize in creating essential oil blends for individuals and health conditions.

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Douglas Dupler
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Essiac tea

Description

Essiac tea is based on a Canadian Ojibwa Indian formula containing primarily **burdock root** (*Arctium lappa*), Turkish **rhubarb root** (*Rheum palmatum*), **sheep sorrel** (*Rumex acetosella*), and the inner bark of the **slippery elm** (*Ulmus fulva* or *Ulmus rubra*). It is used in alternative medicine mainly as a treatment for **cancer**.

The formula is said to have been first developed by an Ojibwa healer to purify the body and balance the spirit. In 1922, the formula came to the attention of Rene Caisse (essiac is Caisse spelled backwards), a nurse in Ontario, Canada, after hearing first-hand accounts of it curing cancer. She began administering the tea to cancer patients and found it to have remarkable healing abilities. She continued treating cancer patients with the tea until she died in 1978. In 1977, Caisse sold the essiac tea formula to the Resperin Corp. of Ontario, Canada.

Caisse reported that hundreds of her patients had been cured of their cancers through the use of her tea, sometimes used as intramuscular injections. Most of the patients came to her after conventional cancer treatments (surgery, chemotherapy, and radiation therapy) failed. Several alternative health care practitioners report essiac tea seems to work best in patients who have had the least amount of radiation therapy or chemotherapy.

The mainstream medical community does not embrace essiac tea. Critics contend that a certain number of cancers deemed incurable spontaneously go into remission without an adequate medical explanation as to why. Others chalk up the successes to the so-called **placebo effect**, where the belief that the treatment is working effects a cure rather than the treatment itself. The treatment is not approved by the American Medical Association or the American Cancer Society.

In 1938, a bill in the Canadian Parliament to legalize essiac tea failed by three votes. It is still not approved for marketing in the United States or Canada. However, the Canadian Health and Welfare Department permits compassionate use of essiac tea on an emergency basis.

In 1975 and again in 1982, the Memorial Sloan-Kettering Cancer Center in New York tested only the sorrel component in the tea. They boiled it, which may have neutralized any beneficial compounds in the leftover tea and administered it to mice with cancerous tumors. It determined the formula had no anticancer effects. The National Cancer Institute and Canadian Bureau of Prescription Drugs reached the same conclusion in the 1980s.

General use

Essiac tea is generally used by alternative health care practitioners to treat, and even cure, various forms of cancer and the side effects of conventional

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KEY TERMS

Chemotherapy—The use of chemical agents to treat or control diseases, especially cancer.

Cholesterol—A steroid alcohol found in human cells and body fluids, implicated in the onset of heart disease.

Degenerative diseases—A group of diseases characterized by progressive degenerative changes in tissue, including arteriosclerosis, diabetes mellitus, and osteoarthritis.

Diabetes—Any of a variety of abnormal conditions characterized by excessive amounts of urine.

Diabetes mellitus—A degenerative disease characterized by inadequate production or absorption of insulin, excessive urine production, and excessive amounts of sugar in the blood and urine.

cancer therapy. It is also used to treat **AIDS**. It is used to a lesser extent to treat a variety of other medical conditions, including diabetes, skin inflammation, liver and thyroid problems, **diarrhea**, ulcers, and some other degenerative diseases. It is more commonly used in Canada than the United States. Other uses include treating **pain**, purifying the blood, healing **wounds**, lowering **cholesterol**, and increasing energy levels.

Although each of the four main ingredients in essiac tea are used to treat other conditions, only the sorrel is used separately to treat cancer. Only when the four are combined do they effect anti-cancer properties. It is not clear exactly how or why the ingredients work in combination, but it is generally believed they work synergistically to stimulate production of antibodies. Caisse herself said she believed essiac tea purified the blood and carried away damaged tissue and infection related to the cancer. She also believed the tea strengthened the immune system, allowing healthy cells to destroy cancerous cells.

Caisse also maintained that tumors not destroyed by essiac tea would be shrunk and could be surgically removed after six to eight weeks of treatment. To insure any malignant cells that remained after treatment and surgery were destroyed, Caisse recommended at least three months of additional weekly essiac treatments.

One of Caisse's patients was her mother, Friseide Caisse, who was diagnosed with liver cancer at the age of 72. Her mother's physician reportedly said she had only days to live. Rene Caisse began giving her mother daily intramuscular injections of the tea. Friseide began recovering within a few days and after a few months, with less frequent doses of essiac, her cancer was gone. She lived to be 90, finally succumbing to **heart disease**.

Preparations

The four main ingredients of essiac tea are sold separately and can be combined at home. Essiac tea is also marketed as tea bags and in bottles of the prepared formula. The basic formula for essiac tea is to combine 6.5 c of cut burdock root, 16 oz of powdered sheep sorrel (including stems, seeds, and leaves), 1 oz of powdered Turkish rhubarb root, and 4 oz of powdered slippery elm bark. Mix the ingredients thoroughly. Boil 2 gal of fresh spring water, add 8 oz of the essiac blend, cover, and boil on high heat for 10 minutes. Turn heat off and let sit for six hours. Remove cover and stir. Replace cover and let steep another six hours. Turn on heat and return the mixture to a boil. Remove from heat and strain into another pot. Wash original pot and strain mixture again into it. Then pour liquid into amber bottles, cap, and store in a dark cool location. Refrigerate after opening.

The formula is ready to use immediately. When ready, shake the bottle well to mix the sediments. Blend 4 tsp of the essiac formula with 4 tsp of warm spring water. The usual daily dosage is 2–4 oz of tea for persons weighing 100–150 lb and 2 oz for every 50 lb over 150 lb. Some alternative health practitioners recommend regular doses of essiac to strengthen the immune system and as a preventative for certain diseases, including cancer. The frequency ranges from daily to weekly.

Precautions

Essiac tea is not recommended for pregnant or lactating women. The formula should not be prepared or stored in plastic or aluminum containers. Sunlight and freezing temperatures destroys the formula's effectiveness. It is generally recommended that persons consult with their physician before treating any condition with essiac. It is important to remember that essiac is often used in combination with traditional cancer treatments, such as chemotherapy, radiation, and surgery.

Side effects

No major adverse side effect have been associated with essiac tea.

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Interactions

Essiac is not known to adversely interact with other medications or nutritional supplements.

Resources

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Ken R. Wells

Eucalyptus

Description

The eucalyptus tree is a large, fast-growing evergreen that is native to Australia and Tasmania. The tree can grow to 375-480 ft (125-160 m). Eucalyptus belongs to the myrtle (Myrtaceae) family. There are more than 300 species of eucalyptus, and *Eucalyptus globulus* is the most well-known species. One species (*E. amygdalin*) is the tallest tree known in the world. The tree grows best in areas with an average temperature of 60°F (15°C).

Eucalyptus trees constitute over 75% of the tree population of Australia. The eucalyptus tree is also known in Australia as the blue gum tree or malee. Other names for eucalyptus include Australian **fever** tree and stringy bark tree. The name is actually derived from the Greek word "eucalyptos," which means "well covered," and refers to the cuplike membrane that covers the budding flowers of the tree.

The bluish green leaves carry the medicinal properties of the tree and grow to a length of 6-12 in (15-30 cm). While the leathery leaves are the sole food for koala bears, the leaves also contain a fragrant volatile oil that has antiseptic, expectorant, antibacterial, anti-inflammatory, deodorant, diuretic, and antispasmodic properties. Other constituents of the leaves include tannins, phenolic acids, flavonoids (eucalyptin, hyperin, hyperoside, quercitin, quercitrin, rutin), sesquiterpenes, aldehydes, and ketones.

KEY TERMS

Diuretic—A substance that promotes urination.

Expectorant—A substance that promotes the coughing up of mucous or other fluids from the lungs.

Febrifuge—A substance that reduces fevers.

Infusion—An herbal tea created by steeping herbs in hot water. Generally, leaves and flowers are used in infusions.

Eucalyptus oil is obtained through a steam distillation process that removes the oil from the fresh, mature leaves and branch tips of older trees. Approximately 25 species of eucalyptus trees in Australia are grown for their oil.

There are three grades of eucalyptus oil: medicinal, which contains the compound eucalyptol (also called cineol); industrial, in which a component of the oil is used in mining operations; and aromatic, which is used in perfumes and fragrant soap products. These oils vary greatly in character. When choosing an oil for therapeutic use, it is important to know from what species the oil was derived. Species used medicinally include *E. globulus*, which contains up to 70% eucalyptol; *E. polybractea*, which contains 85% eucalyptol; and *E. Smithii*. *E. amygdalina* and *E. dives* contain little eucalyptol and are used to separate metallic sulfides from ores in the mining industry. *E. citriodora* contains a lemon-scented oil and is an ingredient in perfumes, as is *E. odorata* and *E. Sturtiana*. Two species, *E. dives* and *E. radiata*, have oils with a strong **peppermint** odor.

The most common species grown for its medicinal oil is *E. globulus*. The eucalyptol found in this species is a chief ingredient in many over-the-counter cold and **cough** remedies, such as cough lozenges, chest rubs, and decongestants. It acts to stimulate blood flow and protects against infection and germs. The *British Pharmocopoeia* requires that commercial eucalyptus oils contain 55% eucalyptol by volume.

Origins

The Australian aborigines have used eucalyptus for hundreds of years as a remedy for fever, **wounds**, coughs, **asthma**, and joint **pain**. Australian settlers

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named the eucalyptus the fever tree because of its disease-fighting properties. Baron Ferdinand von Miller, a German botanist and explorer, was responsible for making the properties of eucalyptus known to the world in the mid-1800s. Likening eucalyptus' scent to that of cajaput oil (a disinfectant), von Miller suggested that eucalyptus might also be used as a disinfectant in fever districts. Seeds of the tree were sent to Algiers, France and planted. The trees thrived and, because of the drying action of the roots, turned one of the marshiest areas of Algiers into a dry and healthy environment, thereby driving away malaria-carrying mosquitoes. Eucalyptus trees were then planted in temperate areas around the world to prevent **malaria**. As a result, eucalyptus trees are now cultivated in China, India, Portugal, Spain, Egypt, South and North Africa, Algeria, South America, and in the southern portion of the United States.

Commercial production of eucalyptus began in Victoria, Australia in 1860. The nineteenth century eclectic doctors adopted eucalyptus as a treatment for fevers, **laryngitis**, asthma, chronic **bronchitis**, **whooping cough**, **gonorrhea**, ulcers, gangrenous tissue, **edema**, and gastrointestinal disturbances. European doctors used eucalyptus oil to sterilize their surgical and medical equipment. Eucalyptus leaves were often made into cigars or cigarettes and smoked to relieve asthma and bronchial congestion.

Modern medicines around the world have included eucalyptus in their practices. Indian ayurvedics use eucalyptus to treat headaches resulting from colds. Eucalyptus is listed in the *Indian Pharmacopoeia* as an expectorant and in the *Chinese Pharmacopoeia* as a skin irritant used in nerve pain. In France, eucalyptus leaves are applied topically to relieve congestion from colds and to treat acute bronchial disease. A standardized eucalyptus tea is licensed in Germany to treat bronchitis and throat inflammations. Eucalyptus is also an ingredient in German herbal cough preparations. The German Commission E has approved the internal use of eucalyptus to treat congestion of the respiratory tract, and the external use to treat rheumatic complaints. In the United States, eucalyptus is a component of many decongestant and expectorating cough and cold remedies, such as cough drops, cough syrups, and vapor baths. Eucalyptus is often used in veterinary medicine. It is used to treat horses with flu, dogs with distemper, and to treat parasitic skin conditions.

General use

Eucalyptus is most popular for its ability to clear congestion due to colds, coughs, flu, asthma, and sinusitis. The tannins found in eucalyptus have astringent properties that reduce mucous membrane inflammation of the upper respiratory tract. Eucalyptol, the chemical component of the oil, works to loosen phlegm. Cough drops containing eucalyptus promote saliva production, which increases swallowing and lessens the coughing impulse. Earaches can also be treated with eucalyptus. When inhaled, the eucalyptus fumes open the eustachian tubes, draining fluids and relieving pressure. Eucalyptus enhances breathing, which makes it an effective remedy for asthma, bronchitis, sinusitis, whooping cough, and colds.

Eucalyptus is a component of many topical arthritis creams and analgesic ointments. When applied to the skin, eucalyptus stimulates blood flow and creates a warm feeling to the area, relieving pain in muscles and joints.

The oil extracted from the eucalyptus leaf has powerful antiseptic, deodorizing, and antibacterial properties. It is especially effective in killing several **strains** of *Staphylococcus* bacteria. A mixture of 2% eucalyptus oil evaporated in an aroma lamp has been shown to destroy 70% of the *Staphylococcus* bacteria in the affected room. When the oil is applied to **cuts**, scrapes, and other minor wounds, it inhibits **infections** and viruses. A 2002 report out of Australia made researchers around the world take note when two cases of patients with staph infections resistant to traditional antibiotic therapy responded to a mixture of eucalyptus leaf oil abstract. The Australian researchers recommended formal clinical trials to test the therapy, based on an ancient aboriginal remedy. Eucalyptus also fights plaque-forming bacteria and is used to treat **gum disease** and gingivitis.

In large doses, the oil can be a kidney irritant and can induce excretion of bodily fluids and waste products. Eucalyptus oil added to water may be gargled to relieve **sore throat** pain or used as a mouthwash to heal mouth sores or gum disorders. Consequently, eucalyptus is an ingredient in many commercial mouthwashes.

Eucalyptus' pain-relieving properties make it a good remedy for muscle tension. One study showed that a mixture of eucalyptus, peppermint, and ethanol oils successfully relieved headache-related muscle tension.

Eucalyptus may lower blood sugar levels. Placing a drop of the oil on the tongue may reduce **nausea**. The oil has also been used to kill dust mites and fleas.

Eucalyptus oil is one of the most well-known fragrances in **aromatherapy**. Two species of eucalyptus are used in aromatherapy oils: *E. globulus* and *E. citriodora*.

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The essential oil of eucalyptus is used to relieve cramps, cleanse the blood, heal wounds, disinfect the air, and to treat conditions such as asthma, bronchitis, throat and sinus infections, fevers, **kidney infections**, rheumatism, bladder infections, and sore muscles.

The essential oil can be diluted and added to a massage oil to ease aching muscles. The oil can be added to hot water and inhaled to reduce nasal congestion. It can also be diffused in the room of a sick patient to disinfect the air.

Some believe that inhaling the diffused oil can enhance concentration and thought processes. Studies have shown that inhalation of the cineole compound of eucalyptus stimulates coordination and motor activities in mice. Eucalyptus oil may also uplift the spirit during times of emotional overload or general sluggishness.

Applying a diluted oil to the skin instead of inhaling it increases the rate of absorption into the blood. Often the speed with which it is absorbed is so fast, the odor can be detected on the breath within minutes.

The oil is also an effective febrifuge, and a cold compress with eucalyptus oil added to it has a cooling effect that is useful in helping to reduce a fever. The essential oil of eucalyptus is also used to treat wounds, herpes simplex virus, skin ulcers, and **acne**. Combined with water, the oil makes an effective insect repellant. Because of its skin-moistening properties, the oil is often an ingredient in **dandruff** shampoo.

Eucalyptus oil may be combined with other oils that have similar properties, such as niaouli, pine, Swiss pine, **hyssop**, and **thyme** oils. It also mixes well with lemon, verbena, balm, and **lavender** oils.

Preparations

Eucalyptus is available as a tincture, cream, ointment, essential oil, or lozenge. Many health food stores carry fresh or dried eucalyptus leaf in bulk. Eucalyptus can be ingested through the use of teas or tincture preparations, inhaled, or applied externally.

Eucalyptus infusion is ingested to treat coughs, colds, bronchitis, congestion, and throat infections. To create an infusion, 1 cup of boiling water is poured over 1-2 teaspoons of crushed eucalyptus leaves. The mixture is covered and steeped for 10 minutes and is then strained. Up to 2 cups can be drunk daily.

Inhaling eucalyptus vapors is beneficial for sinus and bronchial congestion that occurs with bronchitis, whooping cough, colds, asthma, **influenza**, and other respiratory illnesses. A drop of eucalyptus oil or two to three fresh or dried leaves are added to a pan of boiling water or to a commercial vaporizer. The pan is removed from the heat, a towel is placed over the pan and the patient's head, and the patient inhales the rising steam. Patients should close their eyes when inhaling the steam to protect them from eucalyptus' strong fumes.

For healing wounds and preventing infection, the wound is washed and then diluted eucalyptus oil or crushed eucalyptus leaves are applied to the affected area.

For relief of muscle aches or arthritis pain, several drops of the diluted oil are rubbed onto the affected area, or a few drops of diluted oil are added to bath water for a healing bath. Adding eucalyptus leaves wrapped in a cloth to running bath water is also effective.

For gum disease, a few drops of diluted oil are placed on a fingertip and massaged into the gums.

Tinctures should contain 5-10% essential oil of eucalyptus. A person can take 1 ml three times daily.

Ointments should contain 5-20% essential oil of eucalyptus. The person should use as directed for chapped hands, joint and muscle pains, and dandruff.

Precautions

Children or infants should not be treated with eucalyptus. Of special note, eucalyptus oil should not be applied to the facial areas (especially the nose or eyes) of small children or infants. Pregnant or breastfeeding women should not use eucalyptus.

People with digestive problems, stomach or intestinal inflammations, biliary duct disorders, or liver disease should not take eucalyptus.

Undiluted eucalyptus oil should never be ingested. Small amounts of undiluted oil (even in amounts as little as one teaspoon) are toxic and may cause circulatory problems, collapse, suffocation, or death. Eucalyptus oil should always be diluted in a carrier oil such as almond, grapeseed, or other vegetable oil before applying to the skin.

Side effects

Nausea, **vomiting**, or **diarrhea** may occur in rare cases. Applying eucalyptus to the skin may cause a rash in those who are sensitive or allergic to eucalyptus.

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Interactions

Eucalyptus works to detoxify the body. If it is used simultaneously with other drugs, the effects of those drugs may be weakened.

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Eucommia bark

Description

Eucommia bark is the gray, grooved bark of the tree *Eucommia ulmoides*, commonly called the hardy rubber tree or the gutta-percha tree. The Chinese name for eucommia bark is *Du Zhong*. This name refers to a Taoist monk who was said to be immortal, suggesting that the herb provides long life, good health, and vitality. The tree is a member of the rubber family and is native to the mountainous regions of China. It normally grows to about 50 ft (15 m) in height. Small patches of bark are harvested from trees over 10 years old in late summer and early autumn. The outer bark is peeled away and the smooth inner bark is dried. This inner bark contains pure white, elastic latex that is thought to contain the compounds that account for eucommia bark's healing properties. Older, thicker inner bark with more latex is considered more desirable for the herbalist to use than younger, thinner bark.

Although traditionally only the bark of *E. ulmoides* was used for healing, research in the later half of the 1990s in Japan indicated that the leaves also have healing properties. The green leaves are shiny, narrow, and pointed. The tree's flowers are very small and are not used in healing.

General use

Eucommia bark has been used in **traditional Chinese herbalism** for over 3,000 years. Since the tree does not grow widely outside China, this herb was not used in other cultures until the later twentieth century.

Eucommia bark is strongly associated with the kidneys and to a lesser extent with the liver. In Chinese medicine, the kidneys store *jing*. *Jing* is an essential life source and associated with whole body growth and development, as well as normal sexual and reproductive functioning. The kidney and liver *jing* also affects the bones, ligaments, and tendons.

In the Chinese system of health, *yin* aspects must be kept in balance with *yang* aspects. Ill health occurs when the energies and elements of the body are out of balance or in disharmony. Health is restored by taking herbs and treatments that restore that balance.

Eucommia bark is the primary herb used to increase *yang* functions in the body. However, it also supports *yin* functions. Eucommia bark helps to build strong bones and a flexible skeleton with strong ligaments and tendons. It is a primary herb used to heal tissues that are slow to mend after an injury or that have weakened through **stress** or age. It is given to treat lower back and leg **pain**, stiffness, arthritis, and knee problems, including continual dislocation. Eucommia bark is also believed to have diuretic properties that aid in reducing swelling. Although it can be used alone, eucommia bark is most often used in conjunction with other herbs that support its functions.

In addition to healing tissues, eucommia bark has two other major functions. In pregnant women it is given to calm the fetus, soothe the uterus, and prevent miscarriage. Eucommia bark also has the ability to lower blood pressure. This property has been investigated since 1974 and is well established. It may be related to the herb's mild diuretic action.

Other modern uses of eucommia bark include treatment of **impotence**, premature ejaculation, and as a mild anti-inflammatory. It is included in tonics that boost the immune system and generally improve wellness. However, as of the early 2000s, there was little rigorous scientific research to support these uses.

In the late 1990s Japanese researchers became interested in eucommia bark. In 2000, researchers at Nihon University in Chiba, Japan, published two studies showing that both the leaves and the bark of *Eucommia ulmoides* contained a compound that encourages the development of collagen in rats. Collagen is an important part of connective tissues such as

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KEY TERMS

Collagen—A white, fibrous protein that is found in skin, bones, ligaments, tendons, cartilage, and all other connective tissue.

Decoction—The liquid made by boiling an herb, then straining out the solid material.

Diuretic—Any substance that increases the production of urine.

Yang aspects—Identifies qualities such as warmth, light, and activity.

Yin aspects—Identifies qualities that are the opposite of yang aspects, such as cold, stillness, darkness, and passiveness.

tendons and ligaments. They found that the compound was present in much greater quantities in fresh leaves and fresh bark and that much of it was destroyed during the drying process.

In modern Japan, eucommia leaves are also believed to help with weight loss by reducing the urge to eat. For this reason, beginning in the late 1990s eucommia leaves became an increasingly popular herb there. As of the early 2000s, there were no scientific studies to support this function of the herb.

Preparations

Eucommia bark is harvested and dried. Before boiling, it is sliced to expose the inside of the bark. The bark is then boiled to make a decoction. Generally this decoction is combined with other herbs and extracts to create *yang* enhancing tonics to treat kidney and liver deficiencies and impotence.

Precautions

Eucommia bark has a long history of use with no substantial reported problems.

Side effects

No side effects have been reported with the use of eucommia bark. However, the bark contains latex. People who develop **contact dermatitis** (a rash) from exposure latex appear to be able to ingest tonics containing eucommia bark without stimulating an allergic reaction. Nevertheless, individuals with latex allergy should be cautious about using this herb.

Interactions

Eucommia bark is often used in conjunction with other herbs with no reported interactions. Since eucommia bark has been used almost exclusively in Chinese medicine, there are no studies of its interactions with Western pharmaceuticals as of the early 2000s. People who are taking tonics containing eucommia bark should tell their doctors before taking traditional drugs, especially drugs that regulate blood pressure.

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ORGANIZATIONS

Alternative Medicine Foundation, PO Box 60016, Potomac, MD 20859, (301) 340-1960, http://www.amfoundation.org.

American Association of Oriental Medicine, PO Box 162340, Sacramento, CA 95816, (866) 455-7999, (914) 443-4770, http://www.aaaomonline.org.

Centre for International Ethnomedicinal Education and Research (CIEER), http://www.cieer.org.

Tish Davidson, A. M.

Eupatorium

Definition

Eupatorium is a genus of flowering plants with a somewhat uncertain taxonomic description. At times, it has included anywhere from a few dozen to a few hundred species of plants. Some herbal specialists suggest that the genus is one of the most valuable groups of plants for medical purposes of any in the plant kingdom. Some species to which health benefits are credited are:

- *E. ageratoides*, or White Snake-root
- *E. album*, or White Thoroughwort
- *E. aromaticum*, or Mata
- *E. ayapana*, or Water Hemp
- *E. cannabinum*, or Hemp Agrimony
- *E. glutinosum*

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- *E. nervosum*, or Bitter-Bush
- *E. perfoliatum*, or Boneset
- *E. purpureum*, or Joe Pye Weed, or Gravelroot (also Gravel Root)
- *E. rotundifolium*
- *E. rebaudiana*, or Sweet Herb
- *E. teucrifolium*, or Wild Horehound

Eupatorium occurs naturally in temperate regions of North American, Europe, and eastern Asia. Most species are herbaceous plants or shrubs ranging in height from 2 to 10 feet. Flower color, leaf structure, and other physical properties differ somewhat from species to species within the genus.

Medical uses

The two most widely used members of the Eupatorium genus are *E. perfoliatum* and *E. purpureum*. *E. perfoliatum*, or **Boneset** has been widely used by Native Americans for centuries for a variety of uses, and it continues to be popular among herbalists today. The herb is recommended as a digestive tract stimulant, and as a diuretic, laxative, and diaphoretic (an agent that increases perspiration). It is also used as an antipyretic (for the reduction of **fever**) and for the treatment of **gout** and **influenza**. Because of its modest anti-inflammatory properties, it is sometimes used to treat arthritis. All parts of the *E. purpureum* plant are used for medical purposes, although the roots are thought to have the strongest effects. The plant is named after an American Indian who reputedly used it to cure typhus among his neighbors. The dried plant is said to be an effective treatment for kidney and urinary problems, while a tea made from those parts is used as a diaphoretic and antipyretic and for the treatment of rheumatism and **edema**. A less familiar member of the genus in North America is *E. ayapana*, a native of South America, where people have traditionally used the herb to treat a wide variety of disorders including stomach and liver disorders. It has also been used as an antiseptic and vulnerary (wound healing) agent and for the treatment of coughs and tumors.

Side effects

Both Boneset and Joe Pye weed are toxic to humans and other animals in large doses. Pregnant women and individuals with liver problems are advised not to take any form of Eupatorium internally. In general, care must be observed in using either herbal medicine. Some possible side effects include the following:

- nausea
- diarrhea
- vomiting
- rash or itchy or swollen skin
- chest pain
- tightness in the throat or chest
- difficulty in breathing
- muscular weakness or tremors
- constipation

KEY TERMS

Antidiuretic—An agent that reduces fever.

Diaphoretic—A substance that increases the rate of perspiration.

Diuretic—A substance that increase urination.

Interactions

No interactions between Eupatorium preparations and other drugs or foods have as yet been reported. The lack of such information should not be taken to mean that interactions are not possible, however, and individuals should report to their physicians or healers of other medications or herbal supplements they may be taking.

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David Edward Newton, Ed.D.

Euphrasea officinalis see **Eyebright**

Euphrasia

Definition

Euphrasia is a genus of about 450 herbaceous flowering plants. The common name for the genus is **eyebright**, (*Euphrasia officinalisa*) name that comes from the most common traditional medical use for the plant: the treatment of eye disorders.

Description

The name *euphrasia* is derived from one of the three graces in Greek mythology, Euphrosyne, whose name means "gladness." In spite of this classical reference, the plant's medicinal uses were apparently not mentioned until about the fourteenth century, when it was recommended for the cure of all manner of eye diseases. Some early writers (as well as some modern observers) claim healing powers for euphrasia that extend beyond eye problems to include a cure for colds, headaches, and other head problems and an aid to improved memory.

The physical characteristic of euphrasia plants vary depending on soil and other growing conditions. In less desirable conditions, it is a very small plant, sometimes no more than 1 in (2.5 cm) in height. In better environments, it may grow to 8 in (20.3 cm) or more. It has deeply–cut leaves and flowers set on terminal spikes that may be white, bluish–white, violet, or purple in color, often with distinct purple veins. The lower (and sometimes upper) lip contains a yellow patch that apparently acts as a guide for bees, which relish the plant's nectar. The plant occurs in many parts of the world, ranging from mountain tops to near–desert conditions.

Uses

Herbalists, naturopaths, and homeopaths recommend the use of euphrasia for nearly every manner of eye disorder, including irritated eyes, **conjunctivitis**, inflammation of the eyes and eyelids, watery eyes, injuries to the eyes, impaired eyesight, and eye problems related to other diseases and disorders, such as colds, the flu, and **allergies**. They often suggest using the herb in a variety of other head–related problems, such as **headache**, nasal problems, sore throats, and discharge from the eyes, nose, or mouth. In 2008, Natural Standard, an international agency that collects data on complementary and alternative therapies, noted that "[l]ittle data exists regarding the safety and toxicity of eyebright," that there was little clinical evidence on the efficacy of eyebright in treating pink eye, and that there had been essentially no research on the use of eyebright for the treatment of other eye problems or other conditions for which it is recommended.

Natural Standard did take note of the fact that euphrasia contains significant amounts of iridoid glycosides, which have been found to have significant antibacterial action and hepatoprotective (liver–protecting) properties. No research has yet suggested medicinal uses of euphrasia based on these properties.

Preparations

Euphrasia is usually commercially available as a tincture in which the leaves, flowers, and stems of the plant are collected, cut up, and dried and **essential oils** removed in alcoholic solution. The herb can also be prepared as an extract by combining two cups of water with one tablespoon of dried plant parts and boiled for ten minutes. Euphrasia, as a water extract, is also often used as a topical application to the eyes and surrounding areas.

Side effects

Scientific research on the safety and efficacy of euphratis is limited. For this reason, the German Commission E, which has studied the medicinal value of more than 300 herbal medications, has recommended that consumers not use euphratis. The herb is available for sale and use in the United States, however. Almost nothing is known about possible toxic effects of euphratis, although a number of side effects have been documented, including:

- headache
- stuffy nose
- vision problems
- stuffy nose
- muscle weakness
- confusion
- restlessness
- sneezing

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KEY TERMS

Allopathy—A method of treating disease by using substances that are opposite to the symptoms presented by a patient.

Conjunctivitis—Inflammation of the conjunctiva, the mucous membrane surrounding the eye. Also known as pinkeye.

Ophthalmic—Relating to the eye.

Tincture—A preparation made by mixing an herb with an alcohol–water solution.

Because of uncertainties about its safety, euphrasia is generally not recommended during **pregnancy** and breastfeeding. In 2008, the website Drugs.com recommended that "[t]he range of adverse effects [of eyebright] is considered to outweigh the dubious benefits."

Interactions

No interactions between euphratis and prescription or non–prescription medications have been reported. However, some providers warn against using the herb with allopathic ophthalmic products since the combination of drug and herb might tend to "overwhelm" the body's optical system.

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David Edward Newton, Ed.D.

Evening primrose oil

Description

Evening primrose (*Oenothera biennis*) is a tall, hardy, native biennial of the Onagraceae family. Its Latin name is derived from the Greek word *oinos* for wine and *thera* for hunt and reflects the folk belief that the herb could minimize the ill effect of over-indulgence in wine following a hunt.

The plant thrives in dry, sunny meadows, and is abundant in many parts of the world. The leaves of the first-year plant form a bright-green, basal rosette. In the second year, the coarse, erect stalk reaches up to 4 ft (1.2 m) high with hairy, alternate, lanceolate leaves with a distinctive mid rib. Leaves grow from 3–6 in (7.6–15.2 cm) long. The blossoms are pale yellow with a slight lemon scent and a cup-like shape. They grow in clusters along the flower stalk, and bloom from June to September, opening at dusk to attract pollinating insects and night-flying moths. These phosphorescent blossoms inspired a common name for the herb, evening star. The seeds grow within an oblong, hairy capsule. The root is large and fleshy.

General use

The medicinal components of evening primrose are found in the seed-extracted oil, which contains **essential fatty acids** including gamma **linoleic acid** (GLA). GLA is often deficient in the Western diet and is needed to encourage the production of prostraglandins. Low levels of essential fatty acids may increase the symptoms of **premenstrual syndrome** (PMS), diabetes, etc. Evening primrose oil has been used to treat PMS and menopausal symptoms, **asthma**, and has been shown to reduce high blood **cholesterol** levels.

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Evening primrose flower. *(© Photo Researchers, Inc. Reproduced by permission.)*

Research conducted in Great Britain has indicated that evening primrose oil can also be medicinally useful in the treatment of nerve disorders, such as **multiple sclerosis** and **rheumatoid arthritis**. The essential oil does appear to be of some benefit in cases of alcohol poisoning and in alleviating hangovers, and to ease symptoms of alcohol withdrawal. The oil can also help relieve dry eyes, brittle nails, and **acne** when combined with **zinc**. When taken as a supplement, evening primrose has helped to promote weight loss.

Traditionally, Native Americans valued evening primrose as a treatment for **bruises** and **cuts**. The Flambeau Ojibwe tribe soaked the whole plant in warm water to make a poultice for healing bruises and to overcome skin problems. The mucilaginous juice in the stem and leaf can be applied externally to soothe skin irritations, or may be eaten to relieve digestive discomfort and for its stimulating effect on the liver and spleen. The astringent properties of the plant are helpful to soothe inflamed tissue. The plant has sedative properties and has been used to decrease hyperactivity in children.

KEY TERMS

Antioxidant—Any of several substances that have been shown to counteract the damaging effects of oxidation in human and animal tissue. Evening primrose oil is rich in antioxidants.

Biennial—A plant that requires two years to complete the cycle from seed to maturity and death.

Catechin—A yellow, slightly bitter antioxidant found in evening primrose oil. Catechin appears to slow tumor growth and to protect against heart disease.

Mucilage—A gelatin-like plant substance found in leaves and stems. Any substance that resembles mucilage in having a thick or sticky texture is said to be mucilaginous.

The entire plant is edible. The root from the first-year growth is a nutritious pot herb. Boiled roots taste somewhat like parsnips.

Evening primrose oil is valued for its antioxidant properties. **Antioxidants** are substances that counteract the damaging effects of oxidation in living tissue. A team of Canadian researchers has recently identified the specific antioxidant compounds in evening primrose oil; one of them, a yellow substance known as catechin, appears to inhibit the growth of cancerous tumors and to lower the risk of **heart disease**.

Preparations

Evening primrose oil is prepared commercially and widely available in health food stores. The extract should be stored in a cool, dry place in order to avoid spoilage. Capsules are also available. Correct dosage should be decided in consultation with a practitioner.

An ointment can be prepared by mixing one part of the diced plant with four parts of heated petroleum jelly. Stored in a tightly closed container and refrigerated, the preparation will maintain its effectiveness. Apply as needed to soothe the skin.

Precautions

Use by persons with **epilepsy** is discouraged because evening primrose oil appears to lower the effectiveness of medications used to treat epilepsy. Physicians should be consulted before using evening primrose oil on children.

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Side effects

There have been some reports of **headache, nausea**, loose stools, and skin rash after using evening primrose preparations.

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Clare Hanrahan
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***Evodia rutaecarpa* blooming.** *(©blickwinkel / Alamy)*

Evodia fruit

Description

Evodia fruit is the small, reddish fruit of the plant *Evodia rutaecarpa*. This plant is native to northern China and Korea, although it is cultivated as an ornamental landscaping plant in many other places in the world.

E. rutaecarpa is a deciduous tree that grows to a height of about 30 ft (10 m) along the sunny edges of woodlands and in suburban settings as an ornamental. It has long, dark green, shiny leaves and blooms with many small clusters of white flowers in the summer. The fruit, which is the part of the plant used in healing, is reddish when it appears in August and darkens to black by November. The fruit is harvested for medicinal purposes when it is not yet ripe and reddish brown in color. It is then either used fresh or dried. Evodia fruit is also known by its Chinese name *wu zhu yu* and is called *gosyuyu* in Japan.

General use

Evodia fruit has been used since at least the first century A.D. in **traditional Chinese medicine** (TCM). It is characterized as having a warm nature and an acrid, bitter, slightly toxic taste, although the fruit is quite fragrant.

Taken internally, evodia fruit is used to treat symptoms of abdominal distress. These include **nausea, vomiting**, and **diarrhea**. It is said to be especially effective in treating morning diarrhea. Evodia is used to stimulate the appetite and to treat abdominal symptoms associated with lack of interest in food.

Evodia is also used as a painkiller. It is a remedy for headaches, especially headaches associated with nausea and vomiting. Traditional Chinese herbalists use it to treat **pain** in the upper abdomen and pain associated with abdominal hernias. According to Chinese herbalism, the warm nature of the evodia fruit counteracts cold conditions in the stomach.

There are several other reported uses of evodia fruit. The root bark taken internally is considered useful for expelling parasitic tapeworms and pinworms. The fruit is also believed to have contraceptive properties. Various healers report that the fruit has anti-inflammatory, anti-tumor, anti-viral, astringent, and diuretic properties. Although evodia fruit has been used for thousands of years in China, its use only in modern times increased in Japan.

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Scientific research

Scientists, primarily from Japan and China, have undertaken laboratory studies of evodia fruit to determine which traditional uses are supported by modern medical findings.

Researchers at AGI Dermatics in Freeport, New York, studied the effect of evodia extract on skin inflammation. The researchers concluded that compounds found in evodia had powerful anti-inflammatory activity when used on human skin.

That finding was consistent with previous studies by Japanese researchers. They found that compounds extracted from dried evodia fruit had anti-inflammatory and pain-reducing properties in dogs. Reduction of pain was believed to occur because the compounds interfere with pain receptors.

Furthermore, Chinese researchers in Taiwan consistently reported that extracts of evodia fruit interferes with blood clotting. It was anticipated that this finding could be of significance in treating **stroke**.

In addition, Japanese researchers discovered that in test-tube studies extracts of evodia fruit strongly inhibit the growth of one specific bacteria (*Helicobacter pylori*, a bacteria usually treated in mainstream medicine with antibiotics). Unlike conventional antibiotics, the extract did not alter the growth patterns of any other intestinal bacteria. This finding supported the traditional use of evodia fruit in digestive disorders.

Preparations

Evodia fruit can be used fresh, or it can be dried and ground into a powder for medicinal use. Powdered evodia fruit is sometimes mixed with vinegar to make a paste that is applied externally to the navel to relieve **indigestion**. A similar paste is applied to the soles of the feet to treat high blood pressure or directly to sores in the mouth.

Powdered evodia fruit is also taken internally. The usual daily dosage is 1.5 g to 5 g. The herb may be boiled in water and consumed.

Evodia fruit is often mixed with other herbs, such as **ginger**, **pinellia** root, or **coptis**, in formulas to control vomiting. In addition, evodia fruit is used in the TCM formulas ilex and evodia to treat symptoms of cold and flu, including **fever**, **chills**, swollen glands, and sore throat.

KEY TERMS

Deciduous—A tree or bush that sheds its leaves seasonally.

Diuretic—Any substance that increases the production of urine.

Yin—Opposite of yang and having qualities such as cold, stillness, darkness, and passiveness.

Precautions

Evodia fruit is considered by herbalists to be slightly toxic. It should be taken under the supervision of a practitioner or healthcare provider. Pregnant women should not use evodia fruit. Women who desire to conceive a child should keep in mind that evodia fruit is thought to have anti-fertility properties.

Furthermore, the United States Food and Drug Administration does not regulate herbal supplements such as evodia fruit, which means that the remedies have not proven to be safe or effective. The safety of evodia fruit has not been established for use by children, pregnant women, and nursing mothers. In addition, ingredients are not standardized to comply with federal regulations.

Side effects

Herbalists consider evodia fruit mildly toxic, so long-term use is discouraged.

Interactions

As of 2008, there were no known interactions associated with evodia fruit. Evodia fruit is often used in conjunction with other herbs and there were no reported interactions. Since evodia fruit has been used almost exclusively in Chinese medicine, there were no studies of its interactions with Western pharmaceuticals as of 2008.

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American Association of Acupuncture and Oriental Medicine, PO Box 162340, Sacramento, CA 95816, (866) 455-7999, http://www.aaom.org.
National Center for Complementary and Alternative Medicine, National Institute of Health (NCCAM), 9000 Rockville Pike, Bethesda, MD 20892, (888) 644-6226, http://nccam.nih.gov.

Tish Davidson
Liz Swain

Exercise

Definition

Exercise is any activity requiring physical exertion done for the sake of health. Activities range from walking and **yoga** to lifting weights and **martial arts**.

Origins

Regular exercise as a way of promoting health can be traced back at least 5,000 years to India, where yoga originated. In China, exercises involving martial arts, such as **t'ai chi**, **qigong**, and kung fu, developed possibly 2,500 years ago. The ancient Greeks also had exercise programs 2,500 years ago, which led to the first Olympic games in 776 B.C. Other exercise routines have been in use throughout Asia for hundreds of years.

Only within the last 100 years have the scientific and medical communities documented the benefits that even light but regular exercise has on physical and mental health.

The earliest forms of exercise stressed activities that involved stretching and light muscle resistance. Next came martial arts that promoted self-defense. In nearly all forms of Asian exercise routines, some type of **meditation** was a major component because the ancients believed physical and mental health went together. The ancient Greek and Roman civilizations advocated vigorous physical activity since exercise was associated with military training. The Greeks also believed that a healthy body would promote a healthy mind.

KEY TERMS

Aerobic—Any cardiovascular exercise that increases heart rate and breathing, such as jogging, bicycling, and swimming.

Cardiovascular—Relating to the heart and blood vessels.

Kung fu—Another name for qigong; today it more commonly means a Chinese martial arts practice.

Osteoporosis—A bone disease that causes a loss in bone density; occurs most often in postmenopausal women.

Qigong—A Chinese exercise system (similar to t'ai chi) where people learn how to control the flow and distribution of qi (life energy); thought to improve health and harmony of mind and body.

T'ai chi—A slow, relaxed, stylized form of exercise developed by the Chinese; can be called an "inner" martial art.

Taoism—A philosophy of life based on the writings of Chinese philosopher Lao-tse who lived about 500 B.C.

Yin and yang—A Taoist concept that the universe is split into two separate but complementary aspects. Balance is sought between the passive force of yin (female) and the active force of yang (male). The idea of balance between yin and yang is important in traditional Chinese medicine and is the object of various healing arts.

"Physical culture" was popular in the nineteenth and early twentieth centuries. Medical journals showed exercise machines in the 1800s in Europe and North America. Although weight training became popular with a small number of people in the 1940s, it was not until the 1960s that regular exercise programs began to flourish throughout the United States. Gymnasiums, once used mainly by male weight lifters and boxers as training facilities, now are common throughout the United States. Today's gyms and health clubs offer a wide range of exercise activities for men and women that can fit every lifestyle, age group, and exertion level.

Benefits

The medical community recognizes that regular exercise, along with a proper diet, is one of the two most important factors in maintaining good physical and mental health, and in preventing and managing

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many diseases. Most certified physical trainers advocate at least 20 minutes of exercise at least three times a week. But for people who have a sedentary lifestyle, even walking for 10 minutes a day has health benefits. One study of 13,000 people followed for more than eight years showed that people who walk 30 minutes a day have a significantly reduced risk of premature death than people who did not exercise regularly.

Walking and other cardiovascular exercises can reduce the risk of **heart disease**, some cancers, **hypertension** (high blood pressure), arthritis, **osteoporosis**, **stroke**, and **depression**. A study by the Centers for Disease Control and Prevention (CDC) reported in 2001 that running just once a month could help keep bones strong. In addition to physical benefits, a 2001 study showed that exercising just 10 minutes a day can improve mental outlook.

A study released in 2003 reported that exercise combined with **behavioral therapy** may even help manage the symptoms experienced by Gulf War veterans. Specifically, exercise helped improve symptoms related to **fatigue**, distress, cognitive problems and mental health functioning. In the same year, the American Heart Association released a statement saying that exercise was beneficial even for patients awaiting heart transplants. Another study showed that women who participated in strenuous physical activity over a number of years could reduce their risk of **breast cancer**. Finally, research showed that men and women age 40 to 50 who exercised moderately for 60 to 90 minutes a day were less likely to catch a cold than those who sat around.

Description

Exercise comes in many forms, but there are three basic types: resistance, aerobics, and stretching. Yoga and martial arts are basically muscle stretching routines, walking and running are primarily aerobic, and weight lifting is mainly resistance. Exercises such as swimming are considered crossover activities since they build muscle and provide a good aerobic, or cardiovascular, workout. Certified physical trainers usually advocate a combination program that involves stretching, aerobics, and at least some resistance activity for 30-60 minutes a day three times a week.

Stretching and meditative exercises

The most common types of alternative health exercises are the ancient disciplines of yoga and the martial arts (such as t'ai chi and qigong).

YOGA. The ancient East Indian discipline of yoga is probably the most widely practiced exercise advocated by alternative health practitioners. This may be because there is a heavy emphasis on mental conditioning as well as physical exertion. Yoga is the practice of incorporating mind, body, and spirit through a series of physical postures, breathing exercises, and meditation. It improves muscle flexibility, strength, and tone while calming the mind and spirit. Most contemporary **stress** reduction techniques are based on yoga principles.

There are a variety of yoga styles, each with its own unique focus. In the United States, **hatha yoga** is the most practiced. The pace is slow and involves a lot of stretching and breathing exercises. Much like the Chinese philosophy of yin and yang, hatha yoga strives to balance the opposite forces of ha (sun) and tha (moon). Astanga, or power yoga, involves more intense yoga postures done in rapid succession. Its vigorous workout is especially good in developing muscle strength. Iyengar yoga promotes body alignment while kripalu yoga develops mind, body, and spirit awareness. Pranayama yoga is a series of breathing exercises designed to increase vitality and energy.

Yoga helps strengthen the heart and slow respiration. Studies have shown it is beneficial in treating a variety of conditions, including heart disease, hypertension, arthritis, depression, fatigue, chronic **pain**, and carpal-tunnel syndrome. A 2001 study at the Cleveland Clinic Foundation in Ohio looked at yoga's effect on people with lower back pain and pain due to conditions like **carpal tunnel syndrome** and arthritis. After a four-week period, investigators noted that yoga helped lessen pain, improve participants' moods and decreased pain medication requirements.

There are four main groups of yoga postures, also called asanas: standing, seated, reclining prone, and reclining supine. Other groups include forward bends, back bends, side bends, twists, inverted, and balancing. Within each group there are dozens of different yoga poses at beginning and advanced levels.

MARTIAL ARTS. While the words "martial arts" may be associated with conflict, they usually are graceful exercise movements that keep the body and mind strong and healthy. They can be performed by young and old. Martial arts range from simple stretching and meditative exercises to complicated and demanding exercises requiring more physical activity and mental concentration.

Probably the most popular among alternative health participants is t'ai chi, derived from the Chinese philosophy of Taoism and based on the concept of yin and yang. T'ai chi has a self-defense aspect based on

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counteracting an opponent's attack and then counter-attacking, all in the same movement. As an exercise to maintain health, t'ai chi strengthens muscles and joints. It requires deep breathing techniques that increase blood circulation, benefiting the heart, lungs, and other organs. New research states that t'ai chi may improve physical functioning, like bending and lifting, in older age.

Another martial art growing in popularity in the United States is qigong (pronounced chee kung), although it has several forms that are more Taoist and Buddhist than martial. Qigong is a gentle exercise program that can increase vitality, enhance the immune system, and relieve stress when performed regularly. In China, there are hospitals that use qigong to treat terminal illnesses, particularly **cancer**.

Cardiovascular and aerobic

Aerobic, also called cardiovascular, exercises use a variety of muscle groups continuously and rhythmically, increasing heart rate and breathing. Specific aerobic activities include walking, jogging, running, bicycling, swimming, tennis, and cross-country skiing. Another popular form is aerobic dance exercise. Routines should last 10-60 minutes and be performed at least three times a week. Aerobic exercise is especially beneficial for losing weight and building endurance.

Aerobic exercises can be done outside a formal setting, with little or no equipment. However, since boredom is a frequent cause for stopping exercise, it often is beneficial to participate in exercise classes or join a gym or health club. Exercising with a group often helps with motivation. Also, health clubs usually offer a variety of stationary aerobic equipment, such as bikes, treadmills, stair climbers, and rowing machines.

Resistance

Resistance exercises generally are accomplished by lifting weights such as barbells and dumbbells, or by using a variety of resistance machines. They can also be done using only the body as resistance, such as doing push-ups, pull-ups, and sit-ups. Resistance exercise is particularly good for building muscles. For patients with kidney disease, weight lifting offers added benefit. Chronic kidney disease can lead to muscle wasting, which is compounded by low-protein **diets** that may be described for these patients. A 2001 study demonstrated that resistance training can improve muscle mass in kidney disease patients.

Unlike aerobics, which can be done daily, weight-lifting exercises require a period for the muscles to rest and rebuild. A total-body workout should be done every other day, or two to three times a week. A more advanced workout would exercise the lower body muscles one day and upper body muscles the next. It is also important to do 5-10 minutes each of warm-up and cool-down exercises, which will help increase flexibility and decrease soreness and fatigue.

Preparations

No advance preparations are required for exercising. However, a trainer can test a person's strength level and outline an appropriate program. Proper shoes are essential, especially for running. Any exercise should start with a warm-up of 5-10 minutes. Anyone considering a regular exercise program should consult first with a doctor, and possibly a sports podiatrist, to avoid strain and injury. Persons with serious health problems, such as heart disease, diabetes, **AIDS**, **asthma**, and arthritis should only begin an exercise regimen with their doctor's approval.

Precautions

In most people, the main exercise precaution is to avoid strain and overexertion. Exercise does not need to be strenuous to be beneficial. People with certain chronic health problems should take special precautions. Diabetics should closely monitor their blood sugar levels before and after exercising. Heart disease patients should never exercise to the point of chest pain. Exercise can induce asthma. It is essential for people with asthma to get their doctor's permission before starting an exercise program. It also is important for people to be shown the proper form in any activity to avoid strain and possible injury, especially when using exercise equipment. People also should know what parts of the body might be stressed by a particular exercise. They can then use supplemental exercises or stretches to add balance to the exercise program.

Side effects

The primary adverse effects of exercising can be sore muscles and stiff joints a day or two after beginning an exercise routine. These pains may last for several days. Other minor problems can include headaches, **dizziness**, fatigue, and **nausea**, usually indicating the exercise routine is too strenuous. A person can agitate old injuries or create new ones by improperly using equipment or wearing inadequately cushioned shoes.

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Research and general acceptance

There almost is universal acceptance by allopathic and homeopathic health practitioners that exercise can be beneficial to overall good health. Thousands of studies during the past several decades link regular exercise to reduced risks for heart disease, stroke, diabetes, **obesity**, depression, hypertension, and osteoporosis. For example, a 1998 study by Harvard University of more than 11,000 people showed that people who exercise for an hour a day cut their risk of stroke in half over people who do not exercise regularly.

Training and certification

No special training or certification is required for exercising. People who want help in developing an exercise program should consult a certified physical trainer.

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ORGANIZATIONS

Aerobic and Fitness Association of America. 15250 Ventura Blvd., Suite 200, Sherman Oaks, CA 91403. (877) 968-2639. http://www.afaa.com.

American Council on Exercise. 5820 Oberlin Dr., Suite 102, San Diego, CA 92121-0378. (858) 535-8227. http://www.acefitness.org.

American Society of Exercise Physiologists. Department of Exercise Physiology, The College of St. Scholastica, 1200 Kenwood Ave., Duluth, MN 55811. (218) 723-6297. http://www.css.edu/asep.

National Council of Strength & Fitness. P.O. Box 557486, Miami, FL 33255. (800) 772-6273. http://www.ncsf.org.

Ken R. Wells
Teresa G. Odle

Eyebright

Description

Eyebright (*Euphrasia officinalis*) is an annual plant that grows wild in meadows, grassy areas, heaths, and pastures of Britain, northern and western Asia, North America, and Europe. It belongs to the Scrophulariaceae plant family, which also includes the **foxglove** plant.

Eyebright grows to a height of 4-8 in (10-20 cm) and has small white or purple flowers with red spots. These petals resemble bloodshot eyes, suggesting the plant's name and its eye-clearing action. Downy hairs cover the stems, which produce toothed leaves.

Eyebright is a semiparasitic plant. This means that it is nourished by the roots of other plants. Generally, it does not grow well if transplanted from the wild. The plant is harvested during the late summer or fall when the flowers are in bloom. The whole plant is cut off just above the root and then dried.

Eyebright contains vitamins A, C, D, and B complex; **iron**; silicon; and traces of **iodine**, **copper**, and **zinc**. Other components of eyebright include tannins, iridoid glycosides, the flavonoids rutin and **quercetin**,

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KEY TERMS

Annual—A plant that grows every year.

Blepharitis—A condition where the eyelids become red, irritated, and scaly. The eyes are painful, red, and inflamed.

Conjunctivitis—An inflammation of the mucous membranes that cover the outer eyeball and line the eyelids. The eye appears red or pink and is itchy or sore.

Infusion—An herbal tea created by steeping herbs in hot water. Generally, leaves and flowers are used in infusions.

Tincture—The concentrated solution of an herbal extract made with alcohol.

essential fatty acids, glycoside aucuboside, caffeic and ferulic acids, sterols, **choline**, and a volatile oil.

History

The Latin name *Euphrasia* is derived from the Greek word "Euphrosyne," meaning gladness. Euphrosyne was the name of one of three Graces known for her joy and happiness. The ancient Greeks used eyebright to treat eye **infections**, thereby creating happiness.

Eyebright has been used as a folk medicine to treat eye inflammations and infections, coughs, and poor memory since the Middle Ages. The poet Milton mentions eyebright in his book *Paradise Lost*, in which the archangel Michael gives eyebright to Adam to cure an eye infection. In 1485, eyebright was listed in a German book on medicinal herbs. Many sixteenth century herbalists championed eyebright as a treatment for various eye diseases. During the time of Queen Elizabeth, an eyebright ale was popular. Dried eyebright was often combined with tobacco and smoked to provide relief for bronchial colds.

General use

Modern herbalists still prescribe eyebright as a popular remedy for eye irritations and disorders, such as **conjunctivitis** and blepharitis. Icelanders use the juice from the pressed plant to treat most eye afflictions. Scottish people make an infusion in milk for inflamed or weak eyes. Eyebright is used to treat poor vision, eye strain, eye infections, sensitivity to light, and eye ulcers. Eyebright's antiseptic properties are highly regarded in soothing and cooling eyes that itch, burn, weep, and are red.

Eyebright is beneficial in the treatment of coughs, colds, **allergies**, sinusitis, **hay fever**, earaches, headaches, **jaundice**, throat and bronchial congestion, hoarseness, flu, and sinus inflammation. The flavonoids in eyebright act as anti-inflammatory agents that can help relieve inflamed mucous membranes of the eyes, sinuses, and upper respiratory tract. Eyebright's astringent properties also help reduce inflammation and mucous drainage, making the plant a popular remedy for many allergy, cold, and sinus symptoms.

Preparations

The stems, leaves, and flowers of the plant are collected and dried for medicinal use. Eyebright is often combined with **goldenseal** to treat eye afflictions. Eyebright may also be combined with **goldenrod**, **elder** flower, and/or goldenseal to provide relief from congestion.

In **homeopathy**, *Euphrasia officinalis* is a remedy used to treat colds accompanied by a nonirritating, watery nasal discharge and frequent burning tears. Conjunctivitis with symptoms of red eyes and lips, and acrid, watery tears may also be treated with this remedy. *Euphrasia officinalis* is also used as a remedy for **measles** and allergies.

Eyebright is available in bulk form for teas or compresses, and in capsule and tincture forms. Capsules and tinctures should be used as directed on the commercial package.

To make a tea, 1 cup of boiling water is poured over 2-3 teaspoons of dried eyebright and steeped for 5-10 minutes. One cup should be drunk three times daily to maintain eyesight, relieve nasal congestion, and soothe coughs. This infusion can also be used as an eye bath to treat inflamed or painful eyes. The mixture is cooled, and then the eyes are bathed with the warm liquid three to four times daily.

To make a compress, 1-2 tablespoons of dried eyebright are simmered in 1 pint (0.4 l) of water for 10 minutes. The mixture is cooled and then strained. A clean cloth is dipped in the mixture, wrung out, and then placed over the eyes for 15 minutes several times daily. Caution should be used when applying compresses. An unsterilized, homemade compress of eyebright may contain bacteria that could lead to an eye infection.

Precautions

A qualified herbalist should be consulted before administering eyebright to children. Although herbalists

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maintain the benefits of eyebright, there are no known scientific studies or research to validate these claims.

Side effects

If a tincture solution of eyebright is placed on the eyes, tearing, **itching**, reddening, and swelling of the eyelids may develop because of the alcohol in the tincture. Eyebright may also cause a skin rash or **nausea**.

Interactions

There are no known interactions.

Resources

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Jennifer Wurges

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F

Facial massage

Definition

Facial massage is a very popular Western beauty treatment to slow down the **aging** process and achieve younger-looking and healthier skin. It is also used to relieve **stress**, **migraine headache**, **premenstrual syndrome** (PMS) and sinus congestion. It may involve a whole massage session, a portion of a whole-body massage or a part of a facial treatment. Facial massage can be done by a professional massage therapist, an esthetician, or a cosmetologist. Simple massage can also be done at home. Massage of the face is usually done with the hands; however, mechanical massaging devices are also used in beauty salons or spas. A small amount of oil or lotion is often applied to facilitate movement over the delicate facial areas.

In Eastern therapies, facial massage is part of a full-body treatment in which pressure points on the face and neck are stimulated in order to release blockages in the flow of qi, or vital energy. Lotions or oils are not used on the face in **acupressure**, **shiatsu**, or **yoga** techniques of facial massage.

Origins

Massage has been used for **pain** relief, healing and cosmetic improvement by people of all cultures since ancient times. The first written record of **massage therapy** is a Chinese medical text dating from the third century B.C. The ancient Greeks, Persians, Japanese and Indians also recorded the use of massage treatment in great detail in their early medical literature.

The Western version of facial massage as a cosmetic treatment is a relatively recent twentieth-century innovation. It has become especially popular in Europe. Many of the best-known European practitioners have set up shop in the United States and taught others. This form of facial massage has generally been regarded as belonging more to estheticians and makeup artists than to massage therapists.

Benefits

Western-style facial massage may offer the following potential benefits:

- improvement of facial skin and muscle tone.
- relaxation of facial and eye muscles
- relief from tension headaches and facial pain
- alleviation of stress and anxiety
- overall physical and mental relaxation

Facial massage as part of Eastern therapies may offer the following potential benefits:

- stimulation of meridian points on the face
- relief from eyestrain
- correction of liver and gall bladder imbalances
- relief of neck tension
- alleviation of nervous disorders
- relief of premenstrual water retention

Description

Western-style facial massage

In Western massage, a facial massage as part of a full-body treatment is different from a full facial treatment, which includes masks, steaming, and similar techniques. A regular massage simply includes massage of the face, usually at the beginning or the end of the massage session.

For a Western facial massage, a gentle effleurage (gliding) movement is most often used. To perform the facial massage, the strokes must be gentle as well as stimulating, in order not to stretch the skin. Pressure strokes should move upward to give the muscles of the

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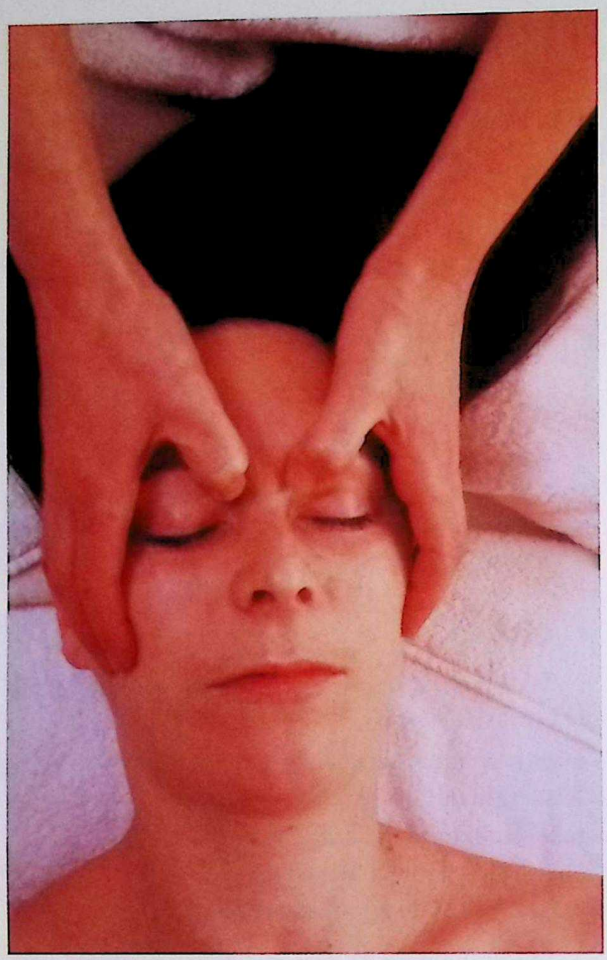

Massage therapist performing a facial massage. *(Custom Medical Stock Photo. Reproduced by permission.)*

face a lift rather than dragging them down. A typical facial massage includes the following steps:

- Before the massage, wash hands with soap and clean water. If the person to be massaged wears contact lens, ask her or him to remove them.
- Position: The most comfortable position has the client lying down on a massage table or sitting in a chair. Facial massage can be done, however, on any flat surface like a clean floor.
- Using a small amount of cleanser, gently wash the client's face. Wet cotton pads or facial sponges or wedges can be used to apply the cleanser. Then remove the cleanser, using fresh damp cotton pads.
- Apply the massage cream or lotion and begin massaging the face and neck areas in small symmetrical circles. The strokes should move up the neck and along the contour of the face. Do not leave out any facial muscles.

KEY TERMS

Massage—A rubbing or kneading with hands or other parts of the body to stimulate circulation, make joints more supple and relieve stress or tension.

- Next, gently glide the back of the hands across the forehead with light pressure. Placing the thumbs side by side on the center of the forehead with the hands cradling the face, draw the thumbs outward towards the temples and make a gentle sweeping movement around the temple. Repeat the movement several times to relieve tension in the temples.
- Apply pressure in the hollow areas under the eyebrows by placing the hands along the sides of the face; use the thumb to press gently under the ridge one spot at a time. Move the pressure point from the inner to the outer edge of the brows and repeat the thumb pressure. This technique can help relieve tension headache.
- Position the thumbs alongside the nose bridge with hands cupping the face. Firmly slide the thumbs downward to the nostrils and outwards along the contour of the cheeks applying pressure along the way. Gently release the pressure when the thumbs reach the hairline. Then pull both hands up alongside the face towards the top of the head and away from the face. Repeat this motion two more times.
- Position fingertips in the cheek muscles and gently make circling movements counter-clockwise for a few times moving along the cheek muscles. This motion alleviates tension in the cheek area.
- Gently stroke the ears with the index fingers and thumbs while moving along the rims of the ears. This technique is very relaxing and enjoyable.
- Position the fingers just behind the neck while pressing with a thumb pad on a spot in the jaw area and circling this spot before moving to the next one. Holding the chin with the fingers, stroke the chin with the thumbs using circular motions downward. Finish the jaw massage with gentle strokes alongside the chin. This movement releases tension in the mouth and jaw.
- Make circular motions on the scalp and comb the fingers through the hair to release tension from the face and the head and to stimulate the scalp.
- Finally, remove the massage cream or lotion with fresh and damp cotton pads. Most facials end with a special lotion applied to the face.

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Facial massage in Eastern therapies

In shiatsu, acupressure, and similar Eastern therapies, pressure is applied to points on the face in order to stimulate or unblock the flow of vital energy in specific meridians. The pressure points located on the face, along with the conditions that they are used to treat, are as follows:

- Stomach 1, under the center of the eye along the nasal bone: Tension and eyestrain.
- Stomach 3, about 4 cm below Stomach 1 at the level of the base of the nose: Sinus and nasal congestion.
- Stomach 4, at the corners of the mouth: General stress and tension.
- Stomach 6, about 2 cm in front of the base of the ear lobe: Toothache.
- Conception vessel (end), between the lower lip and chin: Tension in the face and mouth.
- Bladder 1, at the inside corner of the eye: Headache and eyestrain.
- Gall bladder 1, a hollow about 2 cm from the outside corner of the eye: Headaches.
- Gall bladder 2, the hollow directly above and in front of the ear lobe: Ringing in the ears, swollen eyes, and dizziness.

Some yoga techniques include self-treatment for eye problems or tension by pressing the palms or knuckles against the pressure points surrounding the eyes.

Preparations

Western-style facial massage may require the following items:

- Towel to drape over the shoulders of the person to be massaged.
- Mild cleansing lotion to cleanse the face before massage.
- Moistened cotton pads, cotton-tipped swabs and facial tissues to remove cosmetics, cleansers and massage cream.
- Facial lotion or cream to facilitate the massage.

Facial massage as part of Eastern therapies does not require any specific preparation.

Precautions

Facial massage should not be done if any of the following conditions are present:

- Wearing contact lenses. The client should remove contact lenses before the procedure.
- Open sores, boils or cuts on the face.
- Inflamed or bruised skin.
- Recent scar tissue.
- Acne, psoriasis or eczema. Facial massage can worsen these conditions.

Side effects

Facial massage may irritate and worsen such skin conditions as **acne**, **psoriasis** or **eczema**.

Research and general acceptance

Western-style facial massage is a popular cosmetic procedure for many women and some men to improve the way the skin looks and feels. There is also evidence that massage can reduce stress, **headache** and facial pain.

Training and certification

Training requirements for cosmetologists and estheticians vary from state to state, ranging from a hair-care license to passing a required licensing examination. In addition to the techniques of facial massage, these beauticians may also be knowledgeable regarding clinical cosmetology and skin care.

Facial massage can also be performed by massage therapists as part of a full-body massage. Certified therapists are graduates of accredited massage programs who have passed the national certification examination in therapeutic massage. They are also required to participate in continuing education programs to keep their skills current.

Practitioners of shiatsu, acupressure, and similar Eastern therapies may be certified or licensed by institutions in the United States and abroad that offer instruction in these forms of treatment.

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Tourles, Stephanie. *Naturally Healthy Skin*. Pownal, VT: Schoolhouse Road, 1999.

ORGANIZATIONS

American Massage Therapy Association. 820 Davis St., Suite 100. Evanston, IL 60201. (847) 864-0123. Fax: (847) 864-1178. E-mail: info@inet.amtamassage.org. http://www.amtamassage.org.

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National Association of Nurse Massage Therapists. 1710 East Linden St. Tucson, AZ 85719.
National Certification Board of Therapeutic Massage and Bodywork. 8201 Greensboro Dr., Suite 300. McLean, VA 22102. (703) 610-9015 or (800) 296-0664.

Mai Tran

Faith healing *see* **Prayer and spirituality**
Farsightedness *see* **Hyperopia**

Fasting

Definition

Fasting is voluntarily not eating food for varying lengths of time. Fasting is used as a medical therapy for many conditions. It is also a spiritual practice in many religions.

Origins

Used for thousands of years, fasting is one of the oldest therapies in medicine. Many of the great doctors of ancient times and many of the oldest healing systems have recommended it as an integral method of healing and prevention. Hippocrates, the father of Western medicine, believed fasting enabled the body to heal itself. Paracelsus, another great healer in the Western tradition, wrote 500 years ago that "fasting is the greatest remedy, the physician within." **Ayurvedic medicine**, the world's oldest healing system, has long advocated fasting as a major treatment.

Fasting has also been used in nearly every religion in the world, including Christianity, Judaism, Buddhism, and Islam. Many of history's great spiritual leaders fasted for mental and spiritual clarity, including Jesus, Buddha, and Mohammed. In one of the famous political acts of the last century, the Indian leader Mahatma Gandhi fasted for 21 days to promote peace.

Fasting has been used in Europe as a medical treatment for years. Many spas and treatment centers, particularly those in Germany, Sweden, and Russia, use medically supervised fasting. Fasting has gained popularity in American alternative medicine over the past several decades, and many doctors feel it is beneficial. Fasting is a central therapy in **detoxification**, a healing method founded on the principle that the build up of toxic substances in the body is responsible for many illnesses and conditions.

Benefits

Fasting can be used for nearly every chronic condition, including **allergies**, **anxiety**, arthritis, **asthma**, **depression**, diabetes, headaches, **heart disease**, high **cholesterol**, low blood sugar, digestive disorders, mental illness, and **obesity**. Fasting is an effective and safe weight loss method. It is frequently prescribed as a detoxification treatment for those with conditions that may be influenced by environmental factors, such as **cancer** and **multiple chemical sensitivity**. Fasting has been used successfully to help treat people who have been exposed to high levels of toxic materials due to accident or occupation. Fasting is thought to be beneficial as a preventative measure to increase overall health, vitality, and resistance to disease. Fasting is also used as a method of mental and spiritual rejuvenation.

Description

The principle of fasting is simple. When the intake of food is temporarily stopped, many systems of the body are given a break from the hard work of digestion. The extra energy gives the body the chance to heal and restore itself, and burning stored calories gets rid of toxic substances stored in the body.

The digestive tract is the part of the body most exposed to environmental threats, including bacteria, viruses, parasites, and toxins. It requires the most immune system support. When food is broken down in the intestines, it travels through the blood to the liver, the largest organ of the body's natural detoxification system. The liver breaks down and removes the toxic by-products produced by digestion, including natural ones and the chemicals now present in the food supply. During fasting, the liver and immune system are essentially freed to detoxify and heal other parts of the body.

Many healers claim that fasting is a particularly useful therapy for Americans and for the modern lifestyle, subjected to heavy **diets**, overeating, and constant exposure to food additives and chemicals. Some alternative practitioners have gone so far as to estimate that the average American is carrying 5-10 pounds of toxic substances in their bodies, for which fasting is the quickest and most effective means of removal.

Physiology of fasting

Through evolution, the body became very efficient at storing energy and handling situations when no food was available. For many centuries, fasting was probably a normal occurrence for most people, and

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EVARTS LOOMIS (1910–2003)

Evarts G. Loomis is known as the father of holistic medicine. A homeopathic physician of international renown, he was an advocate of holistic treatment of disease, natural foods, exercise and meditation. Loomis was licensed to practice traditional medicine in 1946, but began early in his career to diverge from a quiet or dull practice. He served as a dog-sled doctor with the Grenfell Mission in Newfoundland, Canada, worked in Algeria, as well as with the Friends Ambulance Unit in China before he founded Meadowlark, the first holistic retreat in North America. Loomis was a pioneer in the holistic health movement in the United States. He was also a proponent of regulated, monitored 24-36 hour fasts, touting the benefits of both the water fast and the all-juice fast.

He and his partner, Fay Loomis, operated Health and Growth Associates, from their home in Hemet, California. Loomis also utilized Dream Work and Kinesiology (the study of human movement) in his health and personal growth counseling.

the body adapted to it. It is estimated that even very thin people can survive for 40 days or more without food. The body has a special mechanism that is initiated when no food is eaten. Fasting is not starvation, but rather the body's burning of stored energy. Starvation occurs when the body no longer has any stored energy and begins using essential tissues such as organs for an energy source. Therapeutic fasts are stopped long before this happens.

Many physiological changes occur in the body during fasting. During the first day or so, the body uses its glycogen reserves, the sugars that are the basic energy supply. After these are depleted, the body begins using fat. However, the brain, which has high fuel requirements, still needs glucose (sugars converted from glycogen). To obtain glucose for the brain, the body begins to break down muscle tissue during the second day of the fast. Thus, during fasting some muscle loss will occur. To fuel the brain, the body would need to burn over a pound of muscle a day, but the body has developed another way to create energy that saves important muscle mass. This protein-sparing process is called ketosis, which occurs during the third day of a fast for men and the second day for women. In this highly efficient state, the liver begins converting stored fat and other nonessential tissues into ketones, which can be used by the brain, muscles, and heart as energy. It is at this point in the fast that sensations of hunger generally go away, and many people experience normal or even increased energy levels. Hormone levels and certain functions become more stable in this state as well. The goal of most fasts is to allow the body to reach the ketosis state in order to burn excess fat and unneeded or damaged tissue. Thus, fasts longer than three days are generally recommended as therapy.

Weight loss occurs most rapidly during the first few days of a fast, up to 2 lbs (1kg) per day. In following days, the figure drops to around 0.5 pound per day. An average weight loss of a pound a day for an entire fast can be expected. Studies show that cutting back just once a month can jump-start healthier eating and help rid one's body of a lifetime of extra calories.

Performing a fast

Fasts can be performed for varying lengths of time, depending on the person and his or her health requirements. For chronic conditions, therapists recommend from two to four weeks to get the most benefits. Seven-day fasts are also commonly performed. A popular fasting program for prevention and general health is a three-day fast taken four times per year, at the change of each season. These can be easily performed over long weekends. Preventative fasts of one day per week are used by many people as well.

Juice fasts are also used by many people, although these are not technically fasts. Juice fasts are less intensive than water fasts because the body does not reach the ketosis stage. The advantage of juice fasts is that fruit and vegetable drinks can supply extra energy and nutrients. People can fit a few days of juice fasting into their normal schedules without significant drops in energy. Juice fasts are also said to have cleansing and detoxifying effects. The disadvantage of juice fasts is that the body never gets to the ketosis stage, so these fasters are thought to lack the deep detoxification and healing effects of the water fast.

Medical supervision is recommended for any fast over three days. Most alternative medicine practitioners, such as homeopaths, naturopathic doctors, and ayurvedic doctors, can supervise and monitor patients during fasts. Those performing extended fasts and those with health conditions may require blood, urine, and other tests during fasting. There are many alternative health

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KEY TERMS

Ayurvedic medicine—A traditional healing system developed in India.

Toxin—A substance that has poisonous effects on the body.

clinics that perform medically supervised fasts as well. Some conventional medical doctors may also supervise patients during fasts. Costs and insurance coverage vary, depending on the doctor, clinic, and requirements of the patient.

Preparations

Fasts must be entered and exited with care. To enter a fast, the diet should be gradually lightened over a few days. First, heavy foods such as meats and dairy products should be eliminated for a day or two. Grains, nuts, and beans should then be reduced for several days. The day before a fast, only easily digested foods like fruits, light salads, and soups should be eaten. During the fast, only pure water and occasional herbal teas should be drunk. If you **exercise**, keep your workouts during fasting light and relatively brief, stopping immediately if you feel dizzy, light-headed or short of breath.

Fasts should be ended as gradually as they are entered, going from lighter to heavier foods progressively. The diet after a fast should emphasize fresh, wholesome foods. Fasters should particularly take care not to overeat when they complete a fast.

Precautions

Fasting is not appropriate for everyone and, in some cases, could be harmful. Any person undertaking a first fast longer than three days should seek medical supervision. Those with health conditions should always have medical support during fasting. Plenty of water should be taken by fasters since dehydration can occur. Saunas and sweating therapies are sometimes recommended to assist detoxification, but should be used sparingly. Those fasting should significantly slow down their lifestyles. Taking time off of work is helpful, or at least reducing the work load. Fasters should also get plenty of rest. Exercise should be kept light, such as walking and gentle stretching.

Side effects

Those fasting may experience side effects of **fatigue**, malaise, aches and pains, emotional duress, **acne**, headaches, allergies, swelling, **vomiting**, bad breath, and symptoms of colds and flu. These reactions are sometimes called *healing crises*, which are caused by temporarily increased levels of toxins in the body due to elimination and cleansing. Lower energy levels should be expected during a fast.

Research and general acceptance

The physiology of fasting has been widely studied and documented by medical science. Beneficial effects such as lowered cholesterol and improved general functioning have been shown. Fasting as a treatment for illness and disease has been studied less, although some studies around the world have shown beneficial results. A 1984 study showed that workers in Taiwan who had severe **chemical poisoning** had dramatic improvement after a ten-day fast. In Russia and Japan, studies have demonstrated fasting to be an effective treatment for mental illness. Fasting was featured on the cover of the *New England Journal of Medicine*, although mainstream medicine has generally ignored fasting and detoxification treatments as valid medical procedures.

The majority of research that exists on fasting is testimonial, consisting of individual personal accounts of healing without statistics or controlled scientific experiments. In the alternative medical community, fasting is an essential and widely accepted treatment for many illnesses and chronic conditions.

Training and certification

The International Association of Professional Natural Hygienists (IAPNH) is an organization of healthcare professionals who specialize in therapeutic fasting. It certifies doctors who have completed approved residencies in therapeutic fasting, including conventional medical doctors, naturopaths, and osteopathic doctors.

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Dried damiara is one of several herbal remedies used to counteract fatigue. *(Geoff Kidd / Photo Researchers, Inc.)*

Fatigue

Definition

Fatigue is physical and/or mental exhaustion that can be triggered by **stress**, medication, overwork, mental and physical illness, or disease.

Description

Everyone experiences fatigue occasionally. It is the body's way of signaling its need for rest and sleep. But when fatigue becomes a persistent feeling of tiredness or exhaustion that goes beyond normal sleepiness, it is usually a sign that something more serious is amiss.

Physically, fatigue is characterized by a profound lack of energy, feelings of muscle weakness, and slowed movements or central nervous system reactions. Fatigue can also trigger serious mental exhaustion. Persistent fatigue can cause a lack of mental clarity (or feeling of mental "fuzziness"), difficulty concentrating, and in some cases, **memory loss**.

Causes and symptoms

Fatigue may be the result of one or more environmental causes such as inadequate rest, improper diet, work and home stressors, or poor physical conditioning. It also can be one symptom of a chronic medical condition or disease process in the body. **Heart disease**, low blood pressure, diabetes, end-stage renal disease, iron-deficiency **anemia**, **insomnia**, **narcolepsy**, **sleep apnea**, chronic obstructive pulmonary disease (COPD), **cancer** or cancer treatment, and untreated **parasitic infections** are a few of the diseases and disorders that can cause long-term, ongoing fatigue symptoms. Acute illnesses such as viral and bacterial **infections** can also trigger temporary feelings of exhaustion. In addition, mental disorders such as **depression** can cause fatigue.

Many common medications, including antihistamines, antibiotics, and blood pressure drugs, may cause drowsiness as a side effect. Individuals already experiencing fatigue who are prescribed one of these medications may wish to check with their healthcare provider about alternative treatments.

Extreme fatigue that persists unabated for at least six months, is not the result of a diagnosed disease or illness, and is characterized by flu-like symptoms such as swollen lymph nodes, **sore throat**, and muscle weakness and/or **pain** may indicate a diagnosis of **chronic fatigue syndrome** (CFS). CFS, also called chronic fatigue immune deficiency syndrome, is a debilitating illness that causes overwhelming exhaustion and a number of neurological and immunological symptoms. Between 1.5 and 2 million Americans are estimated to have this disorder, which is found worldwide. CFS is definitely associated with immune system response and likely caused by a virus or bacteria, although no single cause has yet been identified.

Diagnosis

Patients know when they are fatigued, but because fatigue is a symptom of a number of different disorders, diseases, and lifestyle choices, diagnosing the cause may be difficult. A thorough examination and patient history by a qualified healthcare provider is the first step in determining the cause of the fatigue. A physician can order blood, urine, and other tests to rule out physical conditions and diseases that feature fatigue as a symptom and can also determine if prescription drugs, poor dietary habits, work environment, or other external stressors could be triggering the exhaustion. Several diagnostic tests may also be required to rule out common physical causes of exhaustion, such as blood tests to check for iron-deficiency anemia.

Diagnosis of chronic fatigue syndrome is significantly more difficult. Because there is no specific biological marker or conclusive blood test to check for the disorder, healthcare providers must rely on the patient's condition

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and the severity of symptoms to make a diagnosis. In many cases, individuals with chronic fatigue syndrome go through a battery of invasive diagnostic tests and several years of consultation with medical professionals before receiving a correct diagnosis.

Treatment

The treatment of fatigue depends on its direct cause, but there are several commonly prescribed treatments for non-specific fatigue, including dietary and lifestyle changes, the use of **essential oils** and herbal therapies, deep breathing exercises, **traditional Chinese medicine**, and **color therapy**.

Dietary changes

Inadequate or inappropriate nutritional intake can cause fatigue symptoms. To maintain an adequate energy supply and promote overall physical wellbeing, individuals should eat a balanced diet and observe the following nutritional guidelines:

- Drink plenty of water. Individuals should try to drink a minimum of eight glasses of water a day. Dehydration can reduce blood volume, which leads to feelings of fatigue.
- Eat iron-rich foods (i.e., liver, raisins, spinach, apricots). Iron enables the blood to transport oxygen throughout the tissues, organs, and muscles, and diminished oxygenation of the blood can result in fatigue. Adequate iron is especially important for women of reproductive age, as blood, and the iron it contains, are lost with every menstrual cycle.
- Avoid high-fat meals and snacks. High-fat foods take longer to digest, reducing blood flow to the brain, heart, and rest of the body while blood flow is increased to the stomach.
- Eat unrefined carbohydrates and proteins together for sustained energy.
- Balance proteins. Limiting protein to 15 to 20 grams per meal and two snacks of 15 grams is recommended; however, not getting enough protein adds to fatigue. Pregnant or breastfeeding women should eat more protein.
- Get the recommended dietary allowance of B complex vitamins (specifically, pantothenic acid, folic acid, thiamine, and vitamin B_{12}). Deficiencies in these vitamins can trigger fatigue.
- Get the recommended daily allowance of selenium, riboflavin, and niacin. These are all essential nutritional elements in metabolizing food energy.
- Get the recommended daily allowance of calcium and vitamin D supplementation, which can lessen fatigue symptoms in persons with hypocalcaemia-caused fatigue and also help strengthen bones and prevent osteoporosis.
- Control portion size. Individuals should only eat when they are hungry and stop when they are full. An overstuffed stomach can cause short-term fatigue, and individuals who are overweight are much more likely to regularly experience fatigue symptoms.

Lifestyle changes

Lifestyle factors such as a high-stress job, erratic work hours (e.g., as flight attendants experience), lack of social or family support, or erratic sleep patterns can all cause prolonged fatigue. If stress is contributing to fatigue, **relaxation** therapies and techniques are available to help alleviate tension, including massage, **yoga**, **aromatherapy**, **hydrotherapy**, progressive relaxation exercises, **meditation**, and **guided imagery**. Some may also benefit from individual or family counseling or **psychotherapy** sessions to work through stress-related fatigue that is a result of family or social issues.

Maintaining healthy sleep patterns is critical to getting proper rest. Having a set bedtime helps to keep sleep on schedule. A calm and restful sleeping environment is also important to healthy sleep. Above all, the bedroom should be quiet and comfortable, away from loud noises and with adequate window treatments to keep sunlight and streetlights out. Removing distractions from the bedroom such as televisions and telephones can also be helpful. People who experience insomnia may find herbal or pharmaceutical treatment can help get them back into good sleep patterns.

Essential oils

Aromatherapists, hydrotherapists, and other holistic healthcare providers may recommend the use of essential oils of **rosemary** (*Rosmarinus officinalis*), **eucalyptus** blue gum (*Eucalyptus globulus*), **peppermint**, (*Mentha x piperata*), or scots pine oil (*Pinus sylvestris*) to stimulate the nervous system and reduce fatigue. These oils can be added to bathwater or massage oil as a topical application. Citrus oils such as lemon, orange, grapefruit, and lime have a similar effect and can be added to a steam bath or vaporizer for inhalation.

Herbal remedies

Herbal remedies that act as circulatory stimulants can offset the symptoms of fatigue in some individuals. An herbalist may recommend an infusion of **ginger** (*Zingiber officinale*) root or treatment with **cayenne** (*Capsicum annuum*), balmony (*Chelone glabra*), **damiana**

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(*Turnera diffusa*), ginseng (*Panax ginseng*), or rosemary (*Rosmarinus officinalis*) to treat ongoing fatigue.

An infusion is prepared by mixing the herb with boiling water, steeping it for several minutes, and then removing the herb from the infusion before drinking. A strainer, tea ball, or infuser can be used to immerse loose herbs in the boiling water before steeping and separating them. A second method of infusion is to mix the loose herbal preparation with cold water first, bringing the mixture to a boil in a pan or teapot and then separating the tea from the infusion with a strainer before drinking.

Caffeine-containing central nervous system stimulants such as tea (*Camellia senensis*) and cola (*Cola nitida*) can provide temporary relief of fatigue symptoms. However, long-term use of **caffeine** can cause restlessness, irritability, and other unwanted side effects, and in some cases, it may actually work to increase fatigue after the stimulating effects of the caffeine wear off. To avoid these problems, caffeine intake should be limited to 300 mg or less a day (the equivalent of 4–8 cups of brewed, hot tea).

Traditional Chinese medicine

Chinese medicine regards fatigue as a blockage or misalignment of *qi*, or energy flow, inside the human body. The practitioner of Chinese medicine chooses **acupuncture** and/or herbal therapy to rebalance the entire system. The Chinese formula Minot Bupleurum soup (Xiao Chia Hu Tang) has been used for nearly 2,000 years for the type of chronic fatigue that follows **influenza**. In this condition, the person has low-grade **fever**, **nausea**, and fatigue. Other formulas are helpful in other cases. Acupuncture involves the placement of a series of thin needles into the skin at targeted locations on the body known as acupoints in order to harmonize the energy flow within the human body.

Deep breathing exercises

Individuals under stress often experience fast, shallow breathing. This type of breathing, known as chest breathing, can lead to shortness of breath, increased muscle tension, inadequate oxygenation of blood, and fatigue. Breathing exercises can both improve respiratory function and relieve stress and fatigue.

Deep breathing exercises are best performed while lying flat on the back on a hard surface, usually the floor. The knees are bent, and the body (particularly the mouth, nose, and face) is relaxed. One hand should be placed on the chest and one on the abdomen to monitor breathing technique. With proper breathing techniques, the abdomen will rise further than the chest. The individual takes a series of long, deep breaths through the nose, attempting to raise the abdomen instead of the chest. Air is exhaled through the relaxed mouth. Deep breathing can be continued for up to 20 minutes. After the **exercise** is complete, the individual checks again for body tension and relaxation. Once deep breathing techniques have been mastered, an individual can use deep breathing at any time or place as a quick method of relieving tension and preventing fatigue.

Color therapy

Color therapy, also known as chromatherapy, is based on the premise that certain colors are infused with healing energies. The therapy uses the seven colors of the rainbow to promote balance and healing in the mind and body. Red promotes energy, empowerment, and stimulation. Physically, it is thought to improve circulation and stimulate red blood cell production. Red is associated with the seventh chakra, located at the root, or base, of the spine. In yoga, the chakras are specific spiritual energy centers of the body.

Therapeutic color can be administered in a number of ways. Practitioners of Ayurvedic, or traditional Indian medicine, wrap their patients in colored cloth chosen for its therapeutic hue. Individuals experiencing fatigue would be wrapped in reds and oranges chosen for their uplifting and energizing properties. Patients may also be bathed in light from a color-filtered light source to enhance the healing effects of the treatment.

Individuals may also be treated with color-infused water, which is achieved by placing translucent red colored paper or colored plastic wrap over and around a glass of water and placing the glass in direct sunlight so the water can soak up the healing properties and vibrations of the color. Environmental color sources may also be used to promote feelings of stimulation and energy. Red wall and window treatments, furniture, clothing, and even food may be recommended for their energizing healing properties.

Color therapy can be used in conjunction with both hydrotherapy and aromatherapy to heighten the therapeutic effect. Spas and holistic healthcare providers may recommend red color baths or soaks, which combine the benefits of a warm or hot water soak with energizing essential oils and the fatigue-fighting effects of bright red hues used in color therapy.

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KEY TERMS

Aromatherapy—Therapeutic use of plant-derived, aromatic essential oils to promote physical and psychological wellbeing.

Guided imagery—Use of relaxation and mental visualization to improve mood and/or physical wellbeing.

Hydrotherapy—Use of water (hot, cold, steam, or ice) to relieve discomfort and promote physical wellbeing.

Allopathic treatment

Conventional medicine recommends the dietary and lifestyle changes outlined as a first line of defense against fatigue. Individuals who experience occasional fatigue symptoms may benefit from short-term use of caffeine-containing central nervous stimulants such as energy drinks, which make people more alert and improve coordination. However, these should be prescribed with caution, as overuse of the drug can lead to **sleep disorders** that result in increased fatigue.

Another reason to avoid extended use of caffeine is its associated withdrawal symptoms. People who use large amounts of caffeine over long periods build up a tolerance to it. When that happens, they have to use more and more caffeine to get the same effects. Heavy caffeine use can lead to dependence. If an individual stops using caffeine abruptly, withdrawal symptoms may occur, including **headache**, fatigue, drowsiness, yawning, irritability, restlessness, **vomiting**, or runny nose. These symptoms can go on for as long as a week.

Expected results

Fatigue related to a chronic disease or condition may last indefinitely, but it can be alleviated to a degree through some of the treatment options outlined above. Exhaustion that can be linked to environmental stressors is usually easily alleviated when those stressors are dealt with properly.

There is no known cure for chronic fatigue syndrome, but steps can be taken to lessen symptoms and improve quality of life for these individuals while researchers continue to seek a cure.

Prevention

Many of the treatments mentioned are also recommended to prevent the onset of fatigue. Getting adequate rest and maintaining a consistent bedtime schedule are the most effective ways to combat fatigue. A balanced diet and moderate exercise program are also important to maintaining a consistent energy level.

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Feldenkrais

Definition

The Feldenkrais method is an educational system that allows the body to move and function more efficiently and comfortably. Its goal is to re-educate the nervous system and improve motor ability. The system can accomplish much more, relieving pressure on joints and weak points, and allowing the body to heal repetitive strain injuries. Continued use of the method can relieve **pain** and lead to higher standards of achievement in sports, the **martial arts**, dancing and other physical disciplines.

Pupils are taught to become aware of their movements and to become aware of how they use their

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MOSHE FELDENKRAIS (1904–1984)

Moshe Feldenkrais was born on the border between Russia and Poland. When he was only 13, he traveled to Palestine on foot. The journey took a year, and once there, young Feldenkrais worked as a laborer and cartographer, also tutoring others in mathematics. Moving to France in 1933, he graduated in mechanical and electrical engineering from the Ecole des Travaux Publiques de Paris.

Feldendrais became the first person to open a Judo center in Paris after meeting with Jigaro Kano. He was also one of the first Europeans to become a black belt in Judo, in 1936.

Obtaining his Ph.D. at the Sorbonne, he went on to assist Nobel Prize laureate, Frédéric Joliot-Curie at the Curie Institute. During World War II in England, he worked on the new sonar anti-submarine research.

Prompted by a recurring leg injury, he applied his knowledge of the martial arts and his training as an engineer to devise a method of re-integrating the body. The concept was that more efficient movement would allow for the treatment of pain or disability, and the better-functioning of the body as a whole. Later on, he would begin to teach what he had learned to others in Tel Aviv.

In addition to many books about judo, including *Higher Judo*, he wrote six books on his method.

bodies, thus discovering possible areas of **stress** and strain. The goal of Feldenkrais is to take the individual from merely functioning, to functioning well, free of pain and restriction of movement. Feldenkrais himself stated that his goal was, "To make the impossible possible, the possible easy, and the easy, elegant."

Origins

Moshe Feldenkrais (1904–1984) was a Russian-born Israeli physicist and engineer who was also an active soccer player and judo master. He devised his system in response to his own recurring knee injury, which had restricted his movement and caused him great pain over a long period of time. Feldenkrais believed that repeated muscle patterns cause the parts of the brain controlling those muscles to stay in a fixed pattern as well. He thought that the more the muscles are used, the more parts of the brain can be activated. He devised a method of re-educating the neuromuscular system and re-evaluating movement to increase efficiency and reduce stress, using his knowledge of mechanics and engineering, and applying some of his martial arts training.

Benefits

This method of re-educating the nervous system can be beneficial to a wide range of people, including athletes, children, the elderly, martial artists, those who are handicapped, people with special needs, and people with degenerative diseases. It has also proved popular with artists, particularly musicians, a number of whom have used Feldenkrais to improve their performance.

The Feldenkrais Guild of North America (FGNA) states that over half of the those who turn to Feldenkrais practitioners are seeking relief from pain. Many people who have pain from an injury compensate by changing their movements to limit pain. Often these changed movements remain after the pain from the original injury is gone, and new pain may occur. Feldenkrais helps students become aware of the changed movements and allows them to learn new movements that relieve their pain. Apart from the obvious physical benefits of more efficient movement and freedom from pain and restriction, Feldenkrais practitioners assert that there are other positive benefits for overall physical and mental health. Feldenkrais can result in increased awareness, flexibility, and coordination, and better **relaxation**. Feldenkrais practitioners have also noted other benefits in their students, including improvements in awareness, flexibility, coordination, breathing, digestion, sleep, mood, mental alertness, energy, and range of motion, as well as reduced stress and **hypertension**, and fewer headaches and backaches.

Musicians and athletes can improve their performance in many ways when they learn to use their bodies more efficiently. Feldenkrais can also help injured athletes regain lost potential and free them from pain and restriction of movement.

There are numerous accounts of the remarkable results obtained when Feldenkrais is taught to handicapped children so that they can learn to function despite their limitations. Handicapped people can learn to make full use of whatever potential they have, and to have more confidence in their abilities. Practitioners who specialize in teaching Feldenkrais to those who have handicaps have in many cases allowed the patient to discover ways of performing tasks which were previously thought to be impossible for them.

The elderly, whose movements are often restricted by pain and stiffness, can learn to overcome these

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KEY TERMS

Neuromuscular—The body system of nerves and muscles as they function together.

Repetitive strain injury—Injury resulting from a repeated movement such as typing or throwing a ball.

obstacles with Feldenkrais instruction. In some instances even severe cases of arthritis have been conquered. Theoretically, Feldenkrais can make possible renewed levels of energy and freedom from restriction.

Description

Feldenkrais is described a being a dual system, with two components: "Awareness Through Movement" and "Functional Integration." The system aims to re-educate the body so that habitual movements that cause strain or pain can be relearned to improve efficiency and eliminate dangerous or painful action.

Feldenkrais helps to translate intention into action. In practice, an individual can learn to achieve his or her highest potential, while at the same time learning to avoid and eliminate stresses, **strains**, and the possibility of injury.

Functional integration

During this session, the patient wears comfortable clothing, and may sit, stand, walk, or lie on a low padded table. The practitioner helps the pupil by guiding him or her through a number of movements. The practitioner may use touch to communicate with the student, but touch is not used to correct any movements. The purpose of this session is to increase a student's awareness of his or her own movement and become open to different possibilities for movement. The instruction can be focused on a particular activity that the student does every day, or that causes him or her pain. The student can learn to alter habitual movements and re-educate the neuromuscular system. This type of session is particularly useful for those who have limitations originating from misuse, stress, illness, or accident. It can also help athletes and musicians perform to the best of their ability by increasing their possibilities for movement. It offers students the potential for improving their physical and mental performance in addition to heightening the sense of well-being.

Awareness through movement

Feldenkrais's martial arts background can be clearly identified in many of the aspects of Awareness Through Movement (ATM). During group sessions, pupils are taught to become acutely aware of all their movements and to imagine them, so that they can improve the efficiency of their actions in their minds, and put them into practice. Pupils are encouraged to be disciplined about practicing their exercises, to achieve maximum benefit.

Awareness through movement is described as an exploratory, nonjudgmental process through which pupils are encouraged to observe and learn about themselves and their movements. The range of this therapy is wide, and there are thousands of different lessons designed to help specific areas.

Preparations

No preparation is necessary for the practice of Feldenkrais, and all are encouraged to seek help from this system. No condition is considered a preclusion to the benefits of Feldenkrais.

Precautions

As with any therapy or treatment, care should be taken to choose a qualified practitioner. Feldenkrais practitioners stress that the body must not be forced to do anything, and if any movement is painful, or even uncomfortable, it should be discontinued immediately and the patient should seek professional help.

Side effects

No known side effects are associated with the practice of Feldenkrais.

Research and general acceptance

Since Feldenkrais began to teach his method, it has gradually gained acceptance as an education system. Published research using the method can be found in U.S. and foreign publications.

Training and certification

Guild-accredited Feldenkrais training courses leading to certification for the practice or teaching of the method are available throughout the United States and in other countries. Guild-certified Feldenkrais practitioners undergo a four-year training course (800 hours) that includes studying numerous movements and becoming aware of the smallest details in movement. After two years of formal training, practitioners may become authorized. The FGNA can be contacted to find a certified Feldenkrais practitioner.

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Feldenkrais Guild of North America. 3611 SW Hood Ave., Suite 100, Portland, OR 97201. (800) 775-2118. (503) 221-6612. Fax: (503) 221-6616. http://www.feldenkrais.com.

Patricia Skinner

Feng shui

Definition

Feng shui, pronounced "foong swee" (Cantonese) or "fong shway" (Mandarin) is the Chinese art of arranging buildings, objects, and space in the environment in order to achieve energy harmony and balance. The English translation of Feng shui is "the way of Wind (feng) and Water (shui)" or "the natural forces of the universe."

Origins

Feng shui, derived from the Chinese concept of yin and yang, has been practiced for thousands of years. Evidence of the existence of this practice can be found in the alignment and organization of graves in the Yangshao villages from 6000 B.C. In fact, there is compelling evidence that suggests that feng shui was not strictly an Asian entity. In prehistoric Europe, the practice of arranging objects and structures to be in harmony with the universe was a relatively common practice.

A popular theory regarding the origins of feng shui suggests that the practice stemmed from ancient shaman who understood the vital importance of strategically placing a village. Areas that possessed mild winds would generate plentiful harvests while harsh winds would stunt crop growth or destroy the harvest altogether. In addition, the placement of a village in close proximity to flowing water and fresh springs would stimulate growth and ensure health, while stagnant water would foster disease and disharmony within the community. As the centuries passed, these shaman correlated their thoughts on wind and water with the teachings of Daoism, thus creating the practice of feng shui.

Benefits

As a design philosophy, "good" feng shui is believed to promote health, prosperity, creativity, positive social relationships, self-confidence, contemplation, and respect for others.

Description

An ancient Daoist Chinese theory of design and placement, feng shui grew from observations that an individual's surroundings elicit positive and negative effects. According to Daoism, everything that exists contains qi (chi), the energy or life force. This qi possesses two properties, yin (receptive) and yang (active)—they are opposites and cannot exist without the other. Within the qi, eight constituents compose the universe (the Lake, the Mountain, Fire, Water, Heaven, Thunder, Wind, and Earth). Each trigram, or combination of three yin/yang elements, represents a particular quality and pattern of energy. In turn, the proper arrangement of these energetic qualities would affect not only the qi of the environment, but that of the individual within the environment as well. With feng shui, the goal is to bring both into harmony so as to foster prosperity, health, and well-being with the Wind (feng) dispersing the qi throughout the universe and Water (shui).

The ba gua, or "Sequence of the Later Heaven," is the arrangement of the energy trigrams so that they exist in harmony and balance. Each trigram has a balancing partner that contributes to universal harmony. For example, Earth is balanced by the Mountain, Fire is balanced by the Water, Wind is balanced by Heaven, and Thunder is balanced by Lake. The ba gau is laid in a circular pattern with Fire at the top, followed by Earth, the Lake, Heaven, Water, the Mountain, Thunder, and

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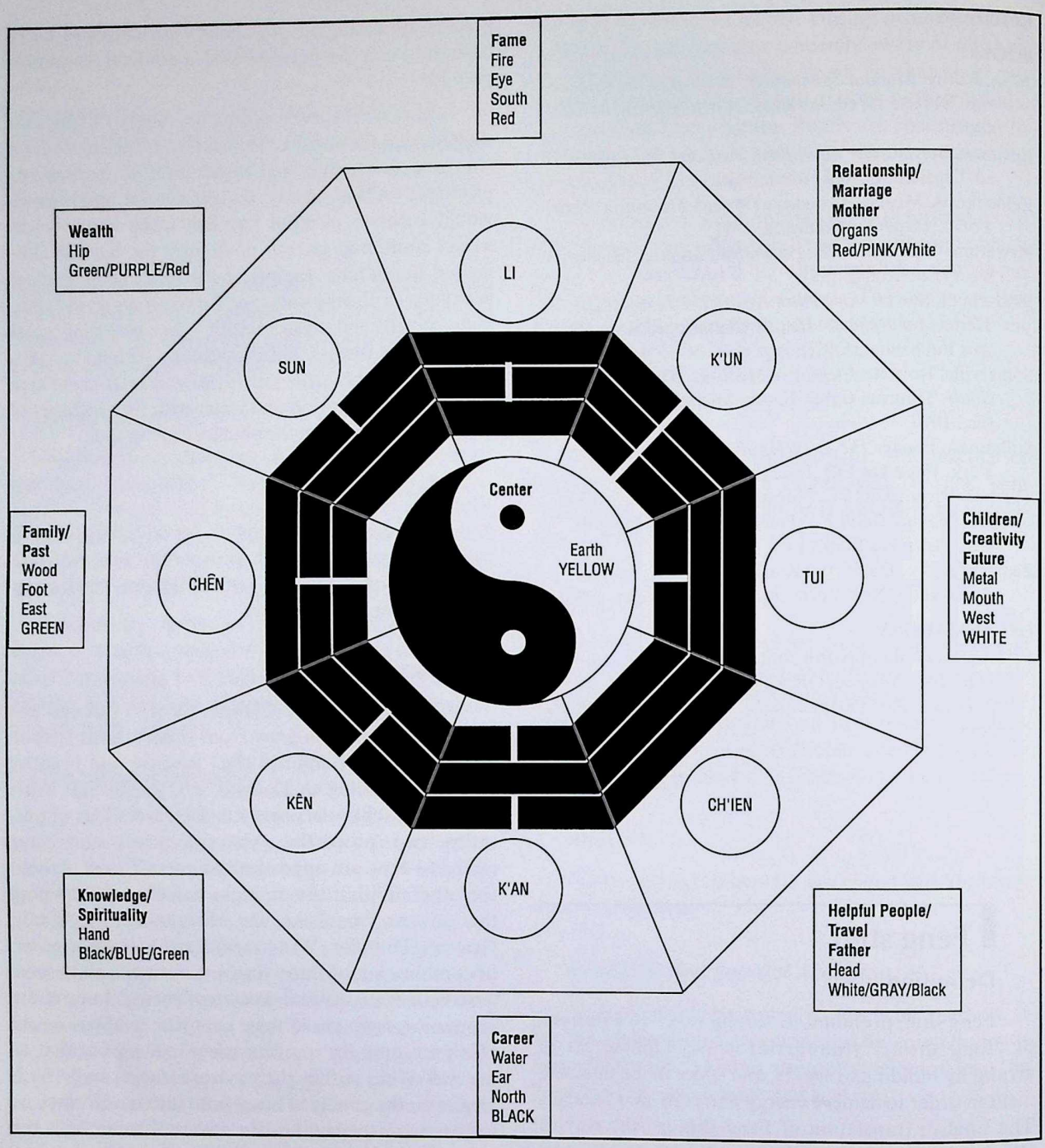

(Illustration by GGS Information Services, Inc. Cengage Learning, Gale)

Wind (clockwise). The Taiji (or yin-yang symbol) is located in the center of the trigrams, and represents the unifying force of the universe.

Practitioners of feng shui use the ba gua to determine the energy flow throughout the home and in other living spaces. By corresponding the trigram pattern to the different parts of a room, a practitioner determines if the room is in harmony with the universe. For example, when analyzing a home office or workspace of a writer or artist, a feng shui specialist would pay particular attention to the portion of the room that corresponds to the Lake of the ba gua, because the Lake represents creative energy. If there is clutter or disorganization in the section of the room that corresponds to

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KEY TERMS

Daoism—Also called Taoism, Dao means "the way." Daoism is a holistic spiritual philosophy of the universe that is based on the idea that all elements in the universe are interactive and interdependent with each other and that the universe and natural world are in a constant state of change, or flux.

the Lake, or if the room is partitioned so that the Lake section is actually occupied by a bookcase or closet, then the environment would be considered to stifle creativity. A feng shui specialist might recommend moving the office to a more hospitable room in the house, or reconstructing the storage space to free up the creative energy in the Lake section of the room. Good health is said to be located in the Wind trigram of the ba gua, so maintaining this space and using it effectively is critical to practitioners of feng shui.

There are many other design tenets of feng shui, but some of the most commonly used and basic concepts include:

- Energy, or qi, enters and exits rooms through doorways. Doors facing each other encourage qi to move too quickly through and out of the room. Doors on adjoining walls encourage a circular movement of qi that is considered relaxing and "good" feng shui.
- Arranging chairs, beds, chaises, sofas, or other seating with their backs to the door and/or windows is not recommended in feng shui. It is considered "bad" feng shui to leave the back exposed to possible attack through the door.
- Homes located at the end of a cul-de-sac, across from a church or other spiritual center, at the end of a bridge, or near a freeway are not desirable to feng shui practitioners because these locations all have either too fast or not enough energy flow.
- When choosing a home site to build on, the ideal location according to feng shui principles is a rectangular plot of land, on a hill, with open space in front of the home.
- The front door of a home should be in proportion to the size of the house. Too large or too small of an entrance will not facilitate proper qi flow through the home.
- Mirrors used in the home should not face chairs or beds.
- Windows should face only pleasing, natural views when at all possible. If a view is dreary, the feng shui of the room can be improved by using window treatments inside and/or window box plantings outside.

Precautions

Individuals should observe basic building code and fire safety rules when redesigning a home according to feng shui principles.

Feng shui adjustments to living space should not be relied upon as a sole source of treatment for individuals with health problems. Although feng shui principles can be employed as an adjunct, or complementary, treatment, proper diagnosis and treatment from a qualified healthcare professional is necessary in treating any chronic or acute physical disorder.

Research and general acceptance

Feng shui has been practiced throughout Asia for thousands of years, and has recently grown in popularity in the United States as a tool for home design. Although considered part of **traditional Chinese medicine** in Asia, it is not largely regarded as a healthcare tool in the United States, preventative or otherwise.

Training and certification

Certification and/or licensing is not required to practice feng shui in the United States. However, there are some national organizations that offer training and certification programs.

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Geomancy, the Feng Shui Education Association. 2939 Ulloa Street, San Francisco, CA 94116. (415) 753-6408. http://www.geofengshui.com.

Paula Ford-Martin

Fennel

Description

Fennel (*Foeniculum vulgare*), also known as *F. officinale*, is a member of the Umbelliferae (Apiaceae) or carrot family, along with dill (*Anethum graveolens*),

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caraway (*Carum carvi*), and **anise** (*Pimpinella anisum*). Fennel has a thick, spindle-shaped taproot that produces a pithy, smooth or finely-fluted round stem that may reach to 6 ft (1.8 m) in height. The finely divided leaves, with numerous thread-like segments, grow from a sheath surrounding the stalk at the base of the leaf stem. The delicate, blue-green filiform leaf segments have a pungent scent, somewhat similar to **licorice**, and an anise-like flavor. This characteristic is due to the presence of the phytochemical anethol, also a primary constituent of anise oil. Fennel's tiny yellow flowers form in large, compound umbells. The blossoms are frequently visited by bees, wasps, and other insects, and fennel leaf is a favorite food of the swallowtail-butterfly.

This perennial native of the Mediterranean is called marathon in Greece, a name derived from the word *maraino*, meaning to grow thin. Fennel was recommended as an herb for weight reduction, "to make people more lean that are too fat," according to the seventeenth century herbalist and astrologer Nicholas Culpeper. He considered fennel to be an herb of Mercury, under the sign of Virgo. In Chinese and Hindu cultures fennel was ingested to speed the elimination of poisons from the system, particularly after snakebite and scorpion **stings**. As one of the ancient Saxon people's nine sacred herbs, fennel was credited with the power to cure what were then believed to be the nine causes of disease. Fennel was also valued as a magic herb. In the Middle Ages it was draped over doorways on Midsummer's Eve to protect the household from evil spirits. As an added measure of protection, the tiny seeds were stuffed into keyholes to keep ghosts from entering the room.

Fennel was introduced to North America by Spanish missionaries for cultivation in their medicinal gardens. Fennel escaped cultivation from the mission gardens, and is now known in California as wild anise. English settlers brought the herb with them to the New England colonies where it became part of their kitchen gardens. In Puritan folk medicine fennel was taken as a digestive aid. The herb is still found growing on the sites of these early English settlements. This attractive, aromatic and sun-loving herb thrives on roadsides, embankments, sea cliffs, and in dry, stony fields.

There are several different species and varieties of fennel that may be annual, biennial, or perennial. *F. vulgare var. dulce*, known as sweet fennel, or *finocchio*, is cultivated for the fleshy basal stalks. The stalks may be eaten fresh, like celery, or boiled and baked as a vegetable. This delicacy is known in Italy as *carosella*. Fennel has naturalized in most temperate areas of the world, and is extensively cultivated for medicinal, ornamental, and culinary uses.

General use

The seeds, leaves, and roots of fennel are safe and edible. The essential oil, extracted from the seeds, is toxic even in small amounts. Fennel has been widely used in culinary and medicinal preparations for centuries. The herb acts as a carminative, and was traditionally employed as a digestive aid and remedy for flatulence. An infusion or decoction of the dried seeds is anti-spasmodic and will ease stomach pains and speed up the digestion of fatty foods. Fennel is a proven remedy for **colic** in infants, and is safe when administered as a mild infusion of the leaf and seed. It is also used for coughs and colds. Fennel exerts a calming influence on the bronchial tissues. The seeds contain large amounts of the phytochemical alpha-pinene, which acts as an expectorant and helps to loosen phlegm in the lungs. An eyewash, prepared from a decoction of the crushed seeds, is said to improve eyesight and reduce irritation and eyestrain. Fennel has a long history of use as a galactagogue. The seed, when boiled in barley water, acts to increase the flow of breast milk in nursing mothers. A poultice of the herb may be helpful to relieve swelling of the breasts during lactation. A leaf and seed tea has been used to expel hookworm and kill intestinal bacteria. Fennel has also been used to promote appetite. The entire herb is used in culinary dishes, and the fleshy sheaths surrounding the base of the leaf stems are a staple in Italian cuisine. The foliage, known as fennel weed, is used to flavor eggs, fish, stews, and vegetables. The root is sometimes grated fresh and added to salads. The licorice-flavored seeds are traditionally served after meals in India to cleanse the breath. The flowers produce a yellow tint and the leaves a light brown hue as a natural dye for wool fabrics.

Fennel seed contains volatile oil, most of which is identified as trans-anethole, with a much smaller amount identified as fenchone. Other components of the essential oil include limonene, camphene, and alpha-pinene.

Preparations

Harvest fennel leaf from time to time throughout the growing season. Use the fresh leaf when possible as the herb may lose much of the flavor when dried. The leaves may also be frozen for later use. Harvest the seeds in autumn. Seeds are fully ripe just as the color fades and the seed-bearing umbells turn from yellow-green to a light brown. Cut the brown umbell from the stalk and place it in a paper bag to dry in a warm room. Shake the dried seeds from the umbell and store them in tightly sealed, clearly labeled, dark-glass containers.

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Harvest the root late in the fall at the same time the stems are harvested as a vegetable. The root is generally less medicinally potent than the seeds.

Seed infusion: Crush 1 tsp–1 tbsp of the dried seed, add to 1 cup of unchlorinated water, fresh milk, or barley water, in a non-metallic pot. Bring to a boil; then steep, covered, for about 10 minutes. A standard dosage of the tea is two to three cups per day.

Root decoction: Add one ounce of the clean, thinly-sliced dry root, or 2 oz of thinly-sliced fresh root, to 1 pt of unchlorinated water in a non-metallic pot. Bring to a boil and simmer for about 10 minutes. Strain and cover. A decoction may be refrigerated for up to two days and retain its healing qualities.

Tincture: Combine half a cup of dried fennel seeds with 1 pt of brandy or vodka in a glass container. Seal the container with an airtight lid. Leave to macerate in a darkened place for two weeks. Shake daily. Strain the mixture through a cheesecloth or muslin bag and pour into a dark bottle for storage up to two years. Dosage is 2–4 ml of the tincture two times a day.

Precautions

Pregnant women should not use the herb, seeds, tincture, or essential oil of fennel in medicinal remedies. Small amounts used as a culinary spice are considered safe. In large doses fennel acts as a uterine stimulant. The essential oil of fennel is toxic in doses as small as 5 ml, and may cause skin irritation, **vomiting**, seizure, and respiratory problems. The volatile oil should not be ingested. The herb and seed oil may cause **contact dermatitis** in sensitive individuals.

Interactions

None reported.

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Clare Hanrahan

Fenugreek

Description

Fenugreek is an herb native to southeastern Europe, northern Africa, and western Asia, but is widely cultivated in other parts of the world. Its botanical name is *Trigonella foenum-graecum*; its English name comes from two Latin words meaning Greek hay. Fenugreek is an annual plant that grows 2–3 ft (0.6–0.9 m) tall, with a strong odor and small pale yellow flowers. The seed of the fenugreek plant contains many active compounds with pharmaceutical applications. The seeds are collected in the autumn. The chemical components of fenugreek seed include **iron**, **vitamin A**, vitamin B_1, **vitamin C**, phosphates, flavonoids, saponins, trigonelline, and other alkaloids. The seed is also high in fiber and protein.

General use

Quite apart from its therapeutic value, fenugreek is used as a seasoning and flavoring agent in foods, particularly in Egypt, India, and the Middle East. The maple smell and flavor of fenugreek have led to its use as a spice in foods, beverages, confections, tobacco, and imitation maple syrup. In some countries, the seeds are eaten raw or boiled, or the greens are enjoyed as a fresh salad. Extracts of fenugreek are used in some cosmetic products as well.

In addition to its use in flavoring foods, the antifungal and antibacterial properties of fenugreek are now being applied to food preservation. In June 2002, a high school student from Maryland was awarded a Lemelson-MIT Invention Apprenticeship for her invention of a food packaging paper made from fenugreek seeds.

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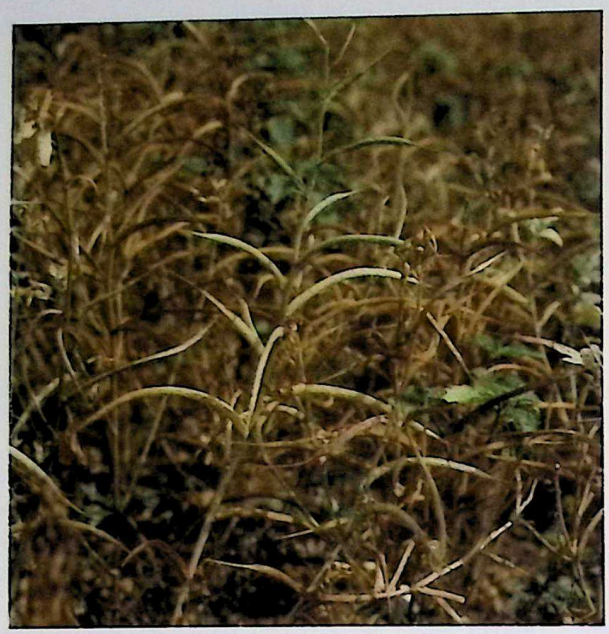

Fenugreek *Trigonella foenum graecum* plant in pod. *(© Holt Studios International Ltd. / Alamy)*

KEY TERMS

Anticoagulant—Any substance that inhibits clotting action.

Antioxidants—Enzymes that bind with free radicals to neutralize their harmful effects on living tissue.

Corticosteroid—A class of hormones generally produced by the adrenal cortex, and often used to lower inflammation.

Galactogogue—A substance that stimulates the production of breast milk in nursing mothers.

Mucilage—A gummy, gelatinous substance that coats fenugreek seeds and helps them absorb water.

Peristalsis—Sweeping, rhythmic contractions of the intestine that move the intestinal contents through the digestive tract.

Topical—Applied to the skin or external surface of the body.

Trigonelline—An alkaloid compound found in fenugreek.

The best-documented medical use of fenugreek is to control blood sugar in both insulin-dependent (type 1) and noninsulin-dependent (type 2) diabetics. Some studies also show that serum **cholesterol** levels in diabetics, and perhaps in others, are reduced by fenugreek. Doses as low as 15 mg per day may produce beneficial effects on fasting blood sugar, elevation of blood sugar after a meal, and overall glycemic control. The use of fenugreek is likely to alter the diabetic patient's need for insulin or other medications used to control blood sugar. This treatment should be supervised by a health care provider familiar with the use of herbal therapies for diabetes. The recommended doses of fenugreek can vary rather widely.

The seeds of fenugreek can also act as a bulk laxative as a result of their fiber and mucilage content. These portions of the seed swell up from being in contact with water, filling the bowel and stimulating peristaltic activity. For laxative purposes, 0.5–1 tsp of freshly powdered herb per cup of water, followed by an additional 8 oz water, can be taken one to three times daily. Patients should begin with the lowest effective dose of fenugreek; they should also avoid taking oral medications or vitamins at the same time as the herb.

Capsules of fenugreek seed are sometimes recommended as a galactogogue, or agent to increase milk production in the lactating mother. This use of the herb should be undertaken cautiously, since the evidence of safety for the nursing infant is only anecdotal. Some commercial teas promoted for the purpose of increasing lactation use fenugreek as an ingredient, but herbal concentration in teas can vary widely and are generally somewhat low.

There is some evidence that internal use of fenugreek seed can decrease some stone-forming substances in the kidney, particularly **calcium** oxalate. Patients who are prone to this type of kidney stone may wish to consult a health care provider about the advisability and dose of fenugreek seed for this use.

Fenugreek may encourage a flagging appetite, and is sometimes given during convalescence from illnesses to improve food intake, weight gain, and speed of recuperation.

Cancer researchers are also studying fenugreek for its potential effectiveness as a cancer chemopreventive. It is thought that fenugreek may help to prevent cancer by raising the levels of vitamin C, **vitamin E**, and other **antioxidants** in the bloodstream.

Historically, fenugreek has been used as a topical treatment for abscesses, **boils**, **burns**, **eczema**, **gout**, and ulceration of the skin as it has an anti-inflammatory effect. It is also reputedly useful for a number of digestive complaints, including **gastritis** and gastric ulcers. A study published in 2002 found that both an

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aqueous solution and a gel fraction derived from fenugreek have anti-ulcer effects comparable to those of omeprazole, a standard medication given to reduce gastric secretions. The researchers found that the fenugreek solution protected the gastric mucosa from injury as well as reducing the secretion of gastric acid.

Fenugreek reportedly can be helpful in the induction of **childbirth**, as it is known to stimulate uterine contractions. For this reason it should not be taken during **pregnancy**. As a gargle, fenugreek may relieve sore throats and coughing. Arthritis, **bronchitis**, fevers, and male reproductive conditions are other traditional but unsubstantiated indications for this herb.

Preparations

Fenugreek may be purchased as bulk seeds, capsules, tinctures, or in teas. Due to the strong, bitter taste, capsules are used most often. The dose is variable, depending on the form of the herb that is used. The seeds may also be soaked to make a tea. For topical use, powdered fenugreek seed is mixed with water to form a paste. Herbal supplements should be stored in a cool, dry place, away from direct light and out of the reach of children.

Precautions

Fenugreek may, when taken in larger amounts than are used to season foods, cause contractions of the uterus. For this reason, women who are pregnant should avoid therapeutic doses. Frequent topical use of fenugreek preparations may cause skin irritation and sensitization. Symptoms of allergic reaction include swelling, numbness, and **wheezing**. This herb should not be used by anyone with sensitivity to fenugreek. Large doses (over 100 g per day) may cause intestinal symptoms, including **diarrhea**, **nausea**, and gas. Blood sugar can also drop to abnormally low levels. Fenugreek is generally recognized as safe, but its safety is not well-documented for use in small children, lactating women, or persons with liver or kidney disease.

Side effects

Depending on the dose used, fenugreek may cause a maple syrup odor in the patient's sweat and urine.

Interactions

Fenugreek can enhance anticoagulant activity, and should not be used with other herbs or medications (heparin, warfarin, ticlopidine) that have this effect due to increased risk of bleeding. It can lower blood sugar to a marked degree; blood sugar levels should be monitored closely, particularly in people who are taking insulin, glipizide, or other hypoglycemic agents. Medications that are being taken to control diabetes may need to have dosages adjusted, which should be done under medical supervision. In theory, since fenugreek is high in mucilage, it can alter the absorption of any oral medication. Corticosteroid and other hormone treatments may be less effective. Monoamine oxidase inhibitors (MAOIs) may have increased activity when used in conjunction with fenugreek.

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ORGANIZATIONS

American Botanical Council. PO Box 144345. Austin, TX 78714-4345.

Centre for International Ethnomedicinal Education and Research (CIEER). http://www.cieer.org.

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Herb Research Foundation. 1007 Pearl St., Suite 200, Boulder, CO 80302. (303) 449-2265. http://www.herbs.org.

OTHER

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Judith Turner
Rebecca J. Frey, PhD

Ferrum phosphoricum

Description

Ferrum phosphoricum, abbreviated as *Ferrum phos.*, is a homeopathic remedy compound made from **iron** and **phosphorus**. Its name is Latin for iron phosphate. The homeopathic formula of iron phosphate is derived from mixing iron sulfate, phosphate, and **sodium** acetate.

General use

Based on the homeopathic "law of similars," which states that any substance that can cause certain symptoms when given to healthy people can cure sick people with similar symptoms, *Ferrum phos.* is the remedy of choice for patients in the early stages of **fever** or other inflammatory conditions. It may also be given to patients experiencing low energy or **anemia**. Of the 2,000–3,000 homeopathic remedies that are available, *Ferrum phos.* is one that often appears on "short lists" of those recommended for a home medicine chest.

It is important to note that homeopaths do not prescribe a given remedy on the basis of a few physical symptoms. They try to match the remedy to the totality of the patient's symptoms, including emotional characteristics and personality traits. Thus a classically trained homeopath would not give *Ferrum phos.* automatically to every patient who walked into the office complaining of fever or a viral illness. A contemporary American practitioner of **homeopathy** recommends giving *Ferrum phos.* when the person does not have clear and distinct symptoms that would point to another remedy. The profile of the *Ferrum phos.* person is that he or she has a lower fever and is more alert than one who needs **belladonna** but less upset and fearful than one who needs **aconite**. Where a patient with the belladonna profile may have a face that is flushed all over with fever, the *Ferrum phos.* patient has clearly defined pink or red patches on the cheeks. The *Ferrum phos.* patient is not focused solely on his or her discomfort and may have conversations with others as if he or she were not ill.

Other characteristics of *Ferrum phos.* patients include a tendency to tire easily. They are nervous, sensitive people, disturbed by anxiety-provoking dreams. They may be restless sleepers, even though their illnesses are often brought on by overexertion. In addition, *Ferrum phos.* patients often bleed easily; they are more prone to **nosebleeds** or minor bleeding from the gums at the onset of an illness. If they **cough** up mucus, it is likely to be streaked with blood.

The homeopathic definition of "symptom" is broader than the standard medical understanding. To a homeopath, symptoms represent the body's attempts to deal with an internal or external ailment. They are guides to choosing the correct remedy rather than problems to be suppressed. A homeopathic practitioner who is asking a patient about symptoms will inquire about the circumstances (e.g., light or dark, heat or cold, rest or activity, etc.) that make the patient feel better or worse. These factors are called modalities in homeopathy. In terms of modalities, gentle motion and applications of cold make *Ferrum phos.* patients feel better, while cold air, nighttime, standing up, and heavy exertion make them feel worse.

A homeopathic practitioner might prescribe *Ferrum phos.* for any of the following conditions:

- tickling coughs accompanied by chest pain
- laryngitis
- red and swollen tonsils
- fevers that start slowly
- ear infections that have not yet produced pus
- incontinence, involuntary urination with coughing, bedwetting
- rheumatic joints
- menstrual periods that begin with headaches
- anemia
- fatigue
- nosebleeds
- sore throats, especially in singers
- vomiting
- diarrhea
- heart palpitations

Preparations

Ferrum phos. is available in the United States in both liquid and tablet form. It can be purchased from homeopathic pharmacies or over the internet. Common potencies of *Ferrum phos.* are 30C and 6X. The

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KEY TERMS

Antidote—Any substance that slows or stops the effects of a homeopathic remedy. Coffee and camphor are considered to be particularly powerful antidotes.

Law of similars—A principle of homeopathic treatment according to which substances that cause specific symptoms in healthy people are given to sick people with similar symptoms.

Modality—A factor or circumstance that makes a patient's symptoms better or worse. Modalities include such factors as time of day, room temperature, the patient's level of activity, sleep patterns, etc.

Potency—The number of times that a homeopathic remedy has been diluted and succussed (shaken). In centesimal potencies, one part of the medicinal substance has been diluted with 99 parts of water or alcohol; in decimal potencies, the ratio is 1:9.

Succussion—A part of the process of making homeopathic remedies, in which the medicinal substance is diluted in distilled water and then shaken vigorously.

Symptom—In homeopathy, a positive sign of the body's self-defense and self-healing that assists the practitioner to choose the correct remedy. Symptoms include the patient's emotional state and psychological characteristics as well as physical symptoms in the narrow sense.

abbreviation 30C stands for a centesimal potency. This indicates that a process of dilution, along with vigorous shaking (succussion) of the remedy, has been repeated 30 times to achieve the desired potency. The abbreviation 6X indicates a decimal potency, and means that this decimal dilution has been repeated six times. In homeopathic practice, the strength of the remedy is in inverse proportion to the amount of chemical or plant extract in the alcohol or water; thus a 30C preparation of *Ferrum phos.* is considered a much higher potency than a 6X preparation. People using homeopathic remedies at home are generally encouraged to use the lower potencies such as 6X or 12X.

Precautions

The precautions recommended by homeopaths reflect concerns about proper administration of the remedies rather than specifying categories of patients who should not receive a given remedy. The quantity of a homeopathic remedy, for example, is less critical than the frequency of dosing. Homeopathy follows the principle of minimal dosing, which means in practice that the patient is not given a second dose of a remedy (or a dose of a different remedy) until the first has completed its action. Minimal dosing is based on the homeopathic belief that remedies work by stimulating or "jump-starting" the body's own natural defenses against illness rather than by killing germs. In general, however, the more severe the patient's acute symptoms, the more often he or she would be given the remedy. A *Ferrum phos.* patient with a bad cold might be given a dose of the remedy every three to six hours, while one with a milder illness might be given only one or two doses a day.

Precautions regarding homeopathic remedies also include avoiding contamination of the medicine. The patient should not touch the medicine; it should be dispensed into a cup and tipped directly into the patient's mouth. Homeopathic remedies are not taken with water but allowed to dissolve in the mouth. Patients are asked not to eat or drink for about twenty minutes before and after each dose.

Side effects

Homeopathic remedies rarely have side effects in the usual sense of the phrase because they are so dilute. On the other hand, a homeopathic remedy may sometimes appear to be making a patient's symptoms temporarily worse as part of the healing process. This temporary aggravation of the symptoms would be regarded by homeopaths as an indication that the remedy is effectively stimulating the patient's body to heal itself.

Interactions

Homeopathic practitioners are not as a rule concerned with drug interactions, in part because homeopathic remedies are so dilute that there is little of the original substance to interact with a prescription given by an allopathic physician. In addition, the homeopathic "single medicine" principle, according to which a patient is given only one homeopathic remedy at a time for a given illness, also minimizes potential interactions among different remedies. For example, a *Ferrum phos.* patient would not be given a different cold or cough remedy unless the homeopath determined that the patient's symptoms were changing and required a remedy with a different symptom profile. There is an ongoing debate among homeopathic practitioners about the legitimacy of combination remedies. Many homeopathic pharmacies sell preparations that

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are low-potency combinations of the most commonly used remedies for use at home. Conservative homeopaths maintain that the possibility of interactions among the different ingredients makes it difficult to evaluate the effectiveness of these combinations.

Homeopaths are, however, concerned about the effect of other substances on homeopathic preparations. They believe that remedies can lose potency through interaction with heat, light, or other substances. Guidelines for proper storage of homeopathic remedies include keeping them away from strong sunlight and high temperatures, keeping them in their original containers, and not storing them near perfumes, bleach, or other strong-smelling substances. In addition, patients under the care of a homeopath are instructed to avoid coffee or products containing camphor (lip balms, chest rubs, etc.) during a period of homeopathic treatment and for two days after the last dose. Homeopaths believe that these substances counteract or "antidote" the effects of homeopathic remedies.

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Boiron Research Foundation. 1208 Amosland Road, Norwood, PA 19074.

Homeopathic Educational Services. 2124 Kittredge Street, Berkeley, CA 94704. (510) 649-0294. (800) 359-9051.

International Foundation for the Promotion of Homeopathy. 2366 Eastlake Avenue East, Suite 301, Seattle, WA 98102. (206) 324-8230.

National Center for Homeopathy (NCH). 801 North Fairfax Street, Suite 306, Alexandria, VA 22314. (703) 548-7790. Fax: (703) 548-7792.

Rebecca Frey

Fever

Definition

A fever is a rise in body temperature to greater than 100°F (37.8°C).

Description

A healthy person's body temperature fluctuates between 97°F (36.1°C) and 100°F (37.8°C), with the average being 98.6°F (37°C). The body maintains stability within this range by balancing the heat produced by the metabolism with the heat lost to the environment. The "thermostat" that controls this process is located in the hypothalamus, a small structure located deep within the brain. The nervous system constantly relays information about the body's temperature to the thermostat. In turn, the thermostat activates different physical responses designed to cool or warm the body, depending on the circumstances. These responses include:

- Decreasing or increasing the flow of blood from the body's core, where it is warmed, to the surface, where it is cooled.
- Slowing down or speeding up the rate at which the body turns food into energy (metabolic rate).
- Inducing shivering, which generates heat through muscle contraction.
- Inducing sweating, which cools the body through evaporation.

A fever occurs when the body's thermostat resets at a higher temperature, which primarily happens in response to an infection. To reach the higher temperature, the body moves blood to the warmer interior, increases the metabolic rate, and induces shivering. The **chills** that often accompany a fever are caused by the movement of blood to the body's core, which leaves the surface and extremities cold. Once the body reaches the higher temperature, the shivering and chills stop. When the infection has been overcome or drugs such as aspirin or acetaminophen (Tylenol) have been taken, the thermostat resets to normal. When this happens, the body's cooling mechanisms switch on. The blood moves to the surface and sweating occurs.

Fever is an important component of the immune response, though its role is not completely understood. Physicians believe that an elevated body temperature has several effects. Certain chemicals in the immune system react with the fever-inducing agent and trigger the resetting of the thermostat. These immune system chemicals also increase the production of cells that fight off the invading bacteria or viruses. Higher temperatures also inhibit the growth of some bacteria and speed up the chemical reactions that help the body's cells repair themselves. Changes in blood circulation may cause the heart rate to increase, which speeds the arrival of white blood cells to the sites of infection.

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KEY TERMS

Antipyretic—A drug that lowers fever, like aspirin or acetaminophen.

Autoimmune disease—Condition in which a person's immune system attacks the body's own cells, causing tissue destruction.

Epstein-Barr virus—A common herpes virus that is responsible for causing infectious mononucleosis. This virus is problematic in people who have a compromised immune system.

Febrile seizure—Convulsions brought on by fever.

Malignant hyperthermia—A rare, inherited condition in which a person develops a very high fever when given certain anesthetics or muscle relaxants in preparation for surgery.

Meningitis—A potentially fatal inflammation of the thin membrane covering the brain and spinal cord.

Metabolism—The chemical process by which the body turns food into energy, which can be given off as heat.

Pyrogen—A chemical circulating in the blood that causes a rise in body temperature.

Reye's syndrome—A disorder principally affecting the liver and brain, marked by the rapid development of life-threatening neurological symptoms.

Causes and symptoms

Fevers are primarily caused by viral or bacterial **infections**, such as **pneumonia** or **influenza**. However, other conditions can induce a fever, including these:

- allergic reactions
- autoimmune diseases
- trauma, such as breaking a bone
- cancer
- excessive exposure to the sun
- intense exercise
- hormonal imbalances
- certain drugs
- damage to the hypothalamus

When an infection occurs, fever-inducing agents called pyrogens are released, either by the body's immune system or by the invading cells themselves. These pyrogens trigger the resetting of the thermostat. In other circumstances, an uncontrolled release of pyrogens may occur when the immune system overreacts due to an allergic reaction or becomes damaged due to an autoimmune disease. A **stroke** or tumor can damage the hypothalamus, causing the body's thermostat to malfunction. Excessive exposure to the sun or intense **exercise** in hot weather can result in heat stroke, a condition in which the body's cooling mechanisms fail. Malignant **hyperthermia** is a rare, inherited condition in which a person develops a very high fever when given certain anesthetics or muscle relaxants in preparation for surgery.

A recent study showed that most parents have misconceptions about fever and view it as a disease rather than a symptom. How long a fever lasts and how high it may go depend on several factors, including its cause and the patient's age and overall health. Most fevers caused by infections are acute, appearing suddenly and then dissipating as the immune system defeats the infectious agent. An infectious fever may also rise and fall throughout the day, reaching its peak in the late afternoon or early evening. A low-grade fever that lasts for several weeks is associated with autoimmune diseases such as lupus or with some cancers, particularly **leukemia** and lymphoma.

Diagnosis

A fever is usually diagnosed using a thermometer. A variety of different thermometers are available, including traditional oral and rectal thermometers made of glass and mercury, and more sophisticated electronic ones that can be inserted in the ear. For adults and older children, temperature readings are usually taken orally. Younger children who cannot or will not hold a thermometer in their mouths can have their temperature taken by placing an oral thermometer under their armpit. Infants generally have their temperature taken rectally using a rectal thermometer.

As important as registering a patient's temperature is determining the underlying cause of the fever. The physician can make a diagnosis by checking for accompanying symptoms and by reviewing the patient's medical history, any recent trips he or she has taken, what he or she may have ingested, or any illnesses he or she has been exposed to. Blood tests hold additional clues. Antibodies in the blood point to the presence of an infectious agent, which can be verified by growing the organism in a culture. Blood tests can also provide the doctor with white blood cell counts. Ultrasound tests, magnetic resonance imaging (MRI) tests, or computed tomography (CT) scans may be ordered if the doctor cannot readily determine the cause of a fever.

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Treatment

Often, doctors must remind patients, especially parents, not to "overtreat" low fevers but to remember that they are symptoms of an underlying disease or condition. Alternative therapies for treatment of fever focus not only on reducing fever but also on boosting the immune function to help the body fight infections more effectively. They include nutritional therapy, herbal therapy and **traditional Chinese medicine**.

Nutritional therapy

Naturopaths often recommend that patients take high doses of **vitamin C** to ward off diseases and prevent fever. In addition to vitamin C, other **antioxidants** such as **vitamin A** and **zinc** also boost the immune function. Naturopaths may also suggest reducing sugar intake (even fruit juices) because sugar depresses the immune system. To replace fluid that is lost during fever, patients are advised to drink vegetable juices and eat soups.

Herbal therapy

Western herbalists use tea preparations containing herbs such as bupleurum root or **boneset** to reduce fever. Mild herbs such as **peppermint**, elderflower, or **yarrow** can provide comfort to the child who has a mild fever. Others believe in sweating a fever out, literally. They often recommend that patients take hot baths to induce sweating. This helps induce or increase fever, which is believed to help the body get rid of infections.

Chinese medicine (TCM) offers many herbs and formulas for fevers. There are many distinct kinds of fevers, also called heat syndromes. For example, an excess-heat syndrome is characterized by a high fever, great thirst, and lots of sweating. Deficiency heat syndrome is characterized by a low-grade fever with afternoon fevers or night sweats. For excess heat, herbs that are dispersing and cold in nature are used. For chronic and low-grade fevers, herbs that tonify the yin (cooling aspect) are used as well as herbs that get rid of heat. There are even herbs such as bupleurum root (called *Chai Hu* in TCM) that are used for intermittent fevers or conditions alternating between fever and chills. Alternating fevers and chills occur in **malaria**, conditions connected to **AIDS**, **chronic fatigue syndrome**, and Epstein-Barr virus. The individual pattern should be diagnosed by a trained practitioner.

Aromatherapy

Patients can reduce feverish symptoms by inhaling **essential oils** of camphor, **eucalyptus**, lemon, and **hyssop**. These oils can also be mixed with an unscented body lotion or a vegetable oil for **aromatherapy** massage.

Homeopathy

Homeopathic doctors may prescribe herbal remedies based on the patient's overall personality profile as well as specific symptoms.

Allopathic treatment

Physicians agree that the most effective treatment for a fever is to address its underlying cause. Also, because a fever helps the immune system fight infection, some clinicians suggest that it be allowed to run its course. Drugs to lower fever (antipyretics) can be given if a patient (particularly a child) is uncomfortable. These include aspirin, acetaminophen (Tylenol), and ibuprofen (Advil). Aspirin should not be given to a child or adolescent with a fever since this drug has been linked to an increased risk of Reye's syndrome. Sponging a child or infant with tepid (lukewarm) water can also help reduce mild fevers.

A fever requires emergency treatment under the following circumstances:

- Newborn (three months or younger) with a fever above 100.5°F (38°C).
- Infant or child with a fever above 103°F (39.4°C). A very high fever in a small child can trigger seizures (febrile seizures) and therefore should be treated immediately.
- Fever accompanied by severe headache, neck stiffness, mental confusion, or severe swelling of the throat. A fever accompanied by these symptoms can indicate the presence of a serious infection, such as meningitis, and should be brought to the immediate attention of a physician.

Expected results

Most fevers caused by infection end as soon as the immune system rids the body of the pathogen. Most fevers do not produce any lasting effects. The prognosis for fevers associated with more chronic conditions, such as autoimmune disease, depends upon the overall outcome of the disorder.

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Mai Tran
Teresa G. Odle

Fever blister *see* **Cold sores**

Feverfew

Description

Feverfew (*Chrysanthemum parthenium* or *Tanacetum parthenium*) is named for one of the herb's traditional medicinal uses as a febrifuge, from the Latin *febrifugia*, indicating its fever-reducing action. This European native of the Compositae (Asteraceae) or aster family has naturalized throughout North and South America, escaping from cultivation. It can be found along roadsides and along the borders of wooded areas. Other common names include featherfew, febrifuge plant, featherfoil, mid-summer daisy, and wild **chamomile**.

Feverfew is a bushy and herbaceous perennial that grows from a branched and tapering root to produce erect, round and slightly grooved stems. The feathery, aromatic, and bitter-tasting leaves are arranged alternately along the length of the many-branched stem. They are a yellow-green, stalked, and bipinnate with deeply cut, toothed segments in an oval shape. Flowers bloom in mid to late-summer in flat-topped clusters at the end of stems that may reach to a height of 3 ft (1 m). Smaller than daisies and without the protruding central disk of chamomile, feverfew blossoms have yellow centers consisting of tightly bunched tubular florets surrounded by creamy white rays. Bees seem to avoid feverfew, deterred by its pungent aroma. The plant self-seeds freely and thrives in full sun or partial shade in most soil.

General use

Feverfew leaves and flowers are used medicinally. Among its many uses, the herb has become a popular and proven herbal remedy for the treatment of migraine headaches. This important use of the plant was recorded as far back as 1633 by the British herbalist John Gerard. With frequent use, over time, feverfew can reduce the frequency, severity, and duration of migraine headaches and allay **nausea** and **vomiting**. It is most effective when used as a preventative. It acts to inhibit serotonin and histamine, substances that dilate blood vessels, and it helps to prevent the spasms in blood vessels that trigger migraine headaches. This much-researched herb has been shown to inhibit production of leukotines and other inflammatory substances. It is an effective remedy for relieving the **pain** and inflammation of arthritis and alleviating **hay fever**, **asthma**, and other allergy symptoms.

Other traditional uses of feverfew dating back to ancient Greece and Rome include its use as an emmenagogue (an infusion taken in cases of sluggish **menstruation** to relieve congestion and promote periodic flow). The herb has also been used after **childbirth** to help expel the placenta.

Feverfew was valued in past centuries for its believed protection against the plague and the bite of mad dogs. In the seventeenth century the herbalist John Parkinson recommended feverfew as a remedy to speed recovery from opium overdose. It has also been used in treating alcoholic delirium tremens and to expel intestinal **worms**. The seventeenth-century English physician Nicholas Culpeper recommended an external application of the fresh herb to treat ague, as the disease **malaria** was once called. Feverfew is a bitter digestive and liver tonic. A hot infusion may reduce **fever** and congestion from colds. The infusion, taken cold, has tonic properties. Feverfew may relieve mild **depression**, promote restful sleep, and ease the nerve pain of **sciatica** and **shingles**. Externally the strong infusion is an antiseptic skin wash for treatment of insect **stings** and **bites**. The wash may also be used as an insect repellent. Feverfew leaves and stems, gathered fresh, may be used as a dye plant, with a chrome mordant, to produce a light green-yellow color in natural fibers such as wool. Feverfew flowers have a purgative action if ingested, and if the blossom heads are carried into areas where bees are located, the insects will fly away.

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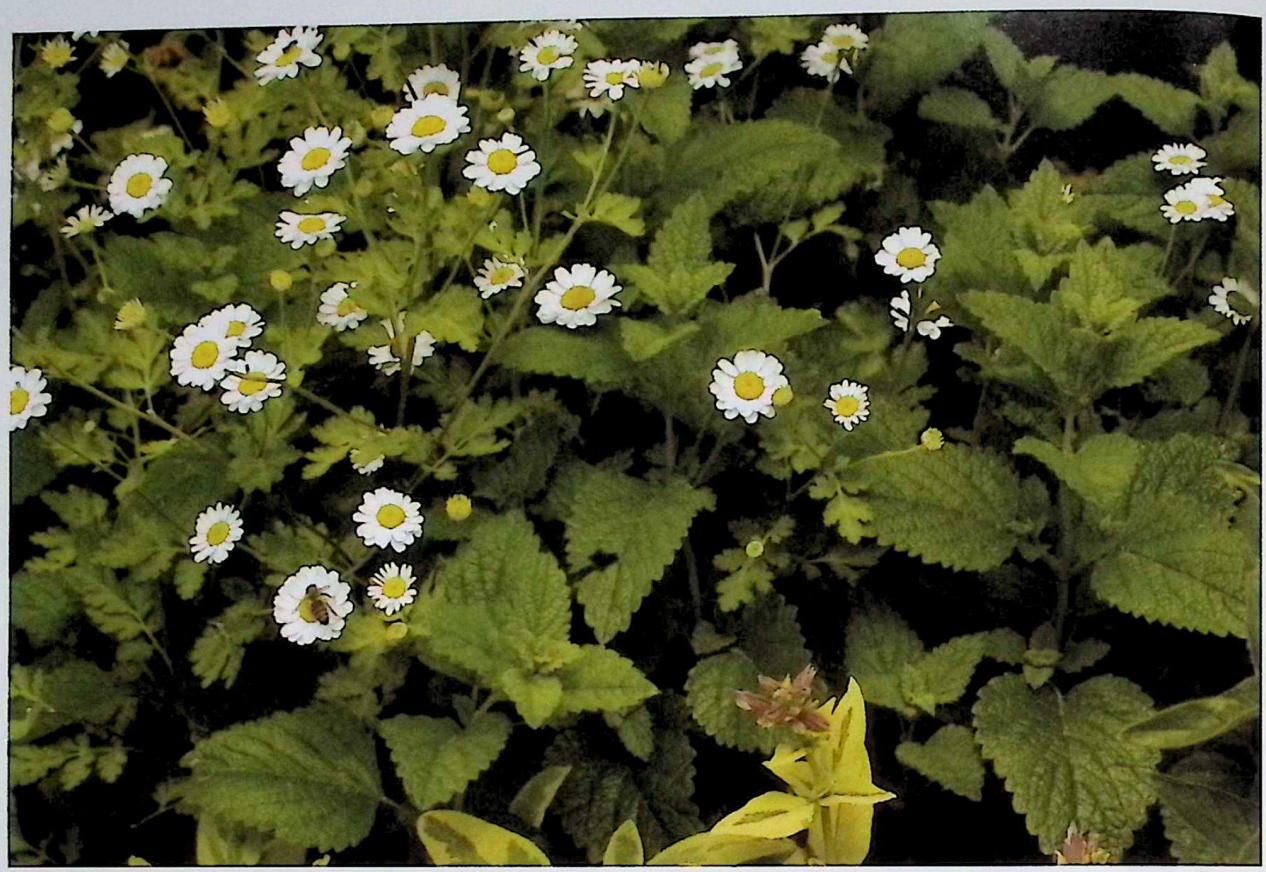

Feverfew. *(© Arco Images / Alamy)*

The active compounds in feverfew include sesquiterpene lactones, predominantly parthenolide. Other phytochemicals include pyrethrin, volatile oils, tannins, bitter resin, and flavonoids.

Most of the benefits claimed for feverfew had not been confirmed scientifically as of 2008. In 2008, the National Center for Complementary and Alternative Medicine of the U.S. National Institutes of Health reported that most claims were either unsubstantiated or supported by limited evidence. It concluded that "There is not enough evidence available to assess whether feverfew is beneficial for [most] uses."

Preparations

Feverfew should be harvested just as the plant comes into flower and before the blossoms are fully open. Leaves are removed from the stalks and dried on paper-lined trays in a light, airy room, away from direct sunlight. The dried herb should be stored in clearly labeled, tightly sealed, dark glass containers.

Feverfew leaf in capsule form, at a 250 mg daily dose, is recommended for medicinal use. It may take four to six weeks before the herb provides noticeable relief. Studies of some commercially prepared capsules revealed that many did not contain a sufficient quantity of the active ingredient to be medicinally effective. Feverfew may be more medicinally potent when gathered fresh. Three to four fresh leaves, taken daily over a period of time are medicinally effective. A certified practitioner can help determine the most effective and safest levels for individual cases.

Fresh feverfew leaf can be added to honey or to a simple sugar syrup. The honey acts as a preservative and masks the bitter taste of the herb.

To make an infusion, one takes two to three teaspoons of chopped, fresh feverfew leaves and place them in a warmed container. One cup of fresh, nonchlorinated boiled water is added to the herbs and the mixture is covered. The tea is infused for about 15 minutes, then strained. A stronger infusion, using double the amount of leaf and steeping twice as long, is useful as a skin wash for repelling insects or soothing inflammations and **wounds**. The strong infusion has also been used as a mouthwash following tooth extraction. The prepared tea can be stored for about two

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days in the refrigerator in an airtight container. The dosage is three cups at different times during the day.

To make a tincture, one combines four ounces of finely cut fresh or powdered dry herb with one pint of brandy, gin, or vodka, in a glass container. The alcohol should be enough to cover the plant parts. Place the mixture away from light for about two weeks, shaking several times each day. Strain and store in a tightly capped, dark glass bottle. A standard dose is 30 drops of the tincture three times a day.

Precautions

Since herbal preparations are not regulated by the U.S. Food and Drug Administration (FDA), consumers in the United States should check the labels of commercial products carefully for dosage instructions and the part(s) of the plant used for or contained in the product. A 2002 study of commercial feverfew preparations found wide variations in the recommended dosages and parthenolide contents of the products that were tested. The researchers found that "intake of parthenolide would range from 0.06 to 9.7 mg/day, a 160-fold variation." Any adverse effects from feverfew preparations or any other herbal products sold as dietary supplements should be reported to the FDA Center for Food Safety and Applied **Nutrition**.

Feverfew should not be used by pregnant or lactating women. Children under two years of age should not be given feverfew. Chewing the fresh leaves may irritate the mucous membranes in the mouth causing mouth ulcers in some persons. Traditionally, the fresh herb was enclosed between slices of bread to minimize the irritation and mask the bitter taste of the fresh leaves. Persons on prescribed blood-thinning drugs should not ingest feverfew as it might interfere with the rate of blood clotting.

Side effects

Feverfew is a safe herb of proven medicinal value. No side effects are reported when taken in designated therapeutic doses. Some cases of **contact dermatitis** and airborne **dermatitis**, however, have been reported by researchers in Denmark and the United States.

Interactions

According to the *PDR For Herbal Medicines*, feverfew may interact with anti-thrombotic medications, including aspirin and warfarin. The tannins in feverfew have been reported to interfere with **iron** absorption in persons who take supplemental iron.

KEY TERMS

Antispasmodic—A substance that relieves spasms in blood vessels or cramping in muscles. Feverfew has antispasmodic properties.

Delirium tremens—A potentially fatal withdrawal syndrome in persons who have become physically dependent on alcohol or other drugs, characterized by shaking, sweating, hallucinations, nausea, and agitation.

Emmenagogue—A substance or medication given to bring on a menstrual period.

Flavonoids—Plant pigments that have a variety of effects on human physiology.

Histamine—A substance released from cells that causes some of the symptoms of an allergic reaction.

Nonsteroidal anti-inflammatory drugs (NSAIDs)—A term used for a group of pain-relieving medications that also reduce inflammation when used over a period of time. NSAIDs are often given to patients with osteoarthritis.

Parthenolide—A sesquiterpene lactone isolated from feverfew that is thought to be responsible for most of its medical effectiveness.

Volatile oil—A concentrated oil that has been distilled from a plant; "volatile" means that the oil evaporates at room temperature.

Taking NSAIDs together with feverfew will decrease the beneficial effects of the herb.

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ORGANIZATIONS

American Botanical Council, 6200 Manor Road, Austin, TX, 78714-4345, (512) 926-4900, www.herbalgram.org.

Herb Research Foundation, 1007 Pearl St., Suite 200, Boulder, CO, 80302, (303) 449-2265, http://www.herbs.org.

National Center for Complementary and Alternative Medicine. National Institutes of Health, 9000 Rockville Pike, Bethesda, MD, 20892, (888) 644-6226, http://nccam.nih.gov/.

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Feverwort *see* **Boneset**

Fibrocystic breast disease

Definition

Fibrocystic breast disease is a general term that refers to a variety of symptoms and diagnoses, including breast lumpiness, tenderness, and a wide range of vaguely-defined benign breast conditions. The term is also used diagnostically to describe the appearance of breast tissues viewed under the microscope, on x-ray film, or on ultrasound equipment.

Description

There is no such thing as a typical or normal female breast. Breasts come in all shapes and sizes, with varying textures from smooth to extremely lumpy. The tissues of the female breast change in response to hormone levels, normal **aging**, nursing (lactation), weight shifts, and injury. To further complicate matters, the breast has several types of tissue, each of which may respond differently to changes in body chemistry.

Fibrocystic breast disease is clearly not a single, specific disease process. Variations or changes in the way the breast feels or looks on an x ray may cause the condition to be called "fibrocystic change." Other names have been used to refer to this imprecise and ill-defined term: mammary dysplasia, mastopathy, chronic cystic mastitis, indurative mastopathy, mastalgia, lumpy breasts, or physiologic nodularity.

KEY TERMS

Selenium—A mineral supplement with antioxidant properties that may be useful for reducing breast pain and tenderness associated with fibrocystic breast disease. The recommended daily allowance of selenium is 70 mcg for men and 55 mcg for women.

Estimates vary, but 40–90% of all women have some evidence of fibrocystic condition, change, or disease. It is most common among women ages 30–50, but may be seen at other ages.

Causes and symptoms

Fibrocystic condition refers to technical findings. This discussion will focus on symptoms a woman experiences, which may fall under the general category of the fibrocystic condition.

The breast is not a soft, smooth, pulpy organ. It is actually a type of sweat gland. Milk, the breasts' version of sweat, is secreted when the breast receives appropriate hormonal and environmental stimulation.

The normal breast contains milk glands, with their accompanying ducts, or pipelines, for transporting the milk. These complex structures may not only alter in size, but can increase or decrease in number as needed. Fibrous connective tissue, fatty tissue, nerves, blood and lymph vessels, and lymph nodes, with their different shapes and textures, lie among the ever-changing milk glands. This explains why a woman's breasts may not feel uniform in texture, and why "lumpiness" may wax and wane.

Fibrocystic condition is the tenderness, enlargement, and/or changing lumpiness that many women encounter just before or during their menstrual periods. At this time, female hormones are preparing the breasts for **pregnancy**, by stimulating the milk-producing cells and storing fluid. Each breast may contain as much as three to six teaspoons of excess liquid. Swelling, with increased sensitivity or **pain**, may result. If pregnancy does not occur, the body reabsorbs the fluid, and the engorgement and discomfort are relieved.

These symptoms range from mildly annoying in some women to extremely painful in others. The severity of the sensations may vary from month to month in the same woman. Although sometimes distressing, this experience is the body's normal response to routine hormonal changes.

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This cycle of breast sensitivity, pain, and/or enlargement can also result from medications. Some hormone replacement therapies used for post-menopausal women can produce these effects. Other medications, primarily, but not exclusively, those with hormones, may also provoke these symptoms.

Breast pain unrelated to hormone shifts is called "noncyclic" pain. This area-specific pain is also called "trigger-zone breast pain," and it may be continuous, or may be felt intermittently. Trauma, such as a blow to the area, or a breast biopsy performed several years before, or sensitivity to certain medications may also underlie this type of pain. Fibrocystic condition may be cited as the cause of otherwise unexplained breast pain.

Lumps, apart from those clearly associated with hormone cycles, may also be placed under the heading of fibrocystic condition. These lumps stand out from enlarged general breast tissue. The obvious concern with such lumps is **cancer**, although noncancerous lumps also occur. Two noncancerous types are fibroadenomas and cysts.

Fibroadenomas are tumors that form in the tissues outside the milk ducts. The cause of fibroadenomas is unknown. They generally feel smooth and firm, with a somewhat rubber-like texture. Typically a fibroadenoma is not attached to surrounding tissue, and will move slightly when touched. They are most commonly found in adolescents and women in their early 20s but can arise at any age.

Cysts are fluid-filled sacs in the breast. They probably develop as ducts become clogged with old cells in the process of normal emptying and filling. Cysts usually feel soft and round or oval. However, a cyst deep within the breast may feel hard, as it pushes up against firmer breast tissue. A woman with a cyst may experience pain, especially if it increases in size before her menstrual cycle, as many do. Women age 30–50 are most likely to develop cysts.

Sometimes one area of breast tissue persistently feels thicker or more prominent than the rest of the breast. This may be caused by hardened scar tissue and/or dead fat tissue from surgery or trauma. Often the cause of such tissue is unknown.

A number of other breast problems that are benign or noncancerous may be placed under the heading of fibrocystic condition. These include disorders that may lead to breast inflammation (mastitis), infection, nipple discharge, dilated milk ducts, milk-filled cyst, wart-like growth in the duct, and excess growth of fibrous tissue around the glands.

Diagnosis

Breast cancer is the concern in most cases of an abnormal breast symptom. A newly discovered breast lump should be brought to the attention of a family physician or an obstetrician-gynecologist. A physical examination of the area is usually performed. Depending on the findings, the patient may be referred for tests.

The most common tests are mammography and breast ultrasound. A cyst may be definitively diagnosed by ultrasound. To relieve the discomfort, the patient may choose to have the cyst suctioned, or drained. If there is any question as to the fluid diagnosis, the fluid is sent for analysis.

If a lump cannot be proven benign by mammography and ultrasound, a breast biopsy may be considered. Tissue is removed through a needle to obtain a sample of the lump. The sample is examined under the microscope by a pathologist, and a detailed diagnosis regarding the type of benign lesion or cancer is established.

A ductogram evaluates nipple discharge. A very fine tube is threaded into the duct, dye is injected, and the area is looked at for diagnosis. Other breast conditions such as inflammation or infection are usually recognized on the basis of suspicious history, such as breastfeeding and characteristic symptoms such as pain, redness, and swelling. A positive response to appropriate therapies will support the diagnosis.

Treatment

Warm soaks, heating pads, or ice packs may provide comfort. A well-fitted support bra worn day and night can minimize physical movement and do much to relieve breast discomfort. Breast massage may promote removal of excess fluid from tissues and alleviate symptoms. Massaging the breast with **castor oil**, straight or infused with herbs or diluted **essential oils**, can help reduce and dissipate fibroadenomas as well as keep women in touch with changes in their breasts.

Many women have reported relief of symptoms when **caffeine** was reduced or eliminated from their **diets**. Decreasing salt intake before and during the period when breasts are most sensitive may also ease swelling and discomfort. Vitamins A, B complex, and E and **selenium** supplements have been reported to be helpful. Because fat promotes estrogen production, and estrogen is thought to be linked to breast tenderness, low-fat diets and elimination of dairy products also seem to decrease soreness for some women. Restricting salt intake may also help reduce fluid retention and lessen breast pain. It may take several months to realize the effects of these various treatments.

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Evening primrose oil (*Oenothera biennis*), flax oil, and fish oils have been reported to be effective in relieving cyclic breast pain for some women. In addition, a focus on liver cleansing is important to assist the body in conjugation and elimination of excess estrogens. The herb chaste tree (*Vitex angus-castus*) can be used to help relieve symptoms of **premenstrual syndrome** (PMS), including breast tenderness.

A Chinese herbalist may recommend Herba cum Radice Asari with Radix Angelicae Sinensis and Flos Carthami Tinctorii for painful breast lumps, or Rhizoma Cyperi Rotundi with Radix Bupleuri and Fructus Trichosanthis for breast masses that swell around the time of **menstruation**.

Allopathic treatment

A lump that has been proven benign can be left in the breast. Some women may choose to have a lump such as a fibroadenoma surgically removed, especially if it is large. **Infections** are treated with warm compresses and antibiotics. Lactating women are encouraged to continue breastfeeding, as it promotes drainage and healing. A serious infection may progress to form an **abscess**, which may need surgical drainage.

Once a specific disorder within the broad category of fibrocystic condition is identified, treatment can be prescribed. Symptoms of cyclical breast sensitivity and engorgement may be treated with diet, medication, and/or physical modifications.

Over-the-counter analgesics (pain relievers) such as acetaminophen (Tylenol) or ibuprofen (Advil) may be recommended. In some cases, treatment with hormones or hormone blockers may prove successful. Birth control pills may be prescribed.

Expected results

Most benign breast conditions carry no increased risk for the development of breast cancer. However, a small percentage of biopsies will uncover overgrowth of tissue in a particular pattern in some women that indicates a 15–20% risk of developing breast cancer over the next 20 years. Strict attention to early detection measures, such as annual mammograms, is especially important for these women.

Prevention

No way has yet been proven to prevent the various manifestations of fibrocystic condition from occurring. Some alternative practitioners believe that elimination of foods high in methylxanthines (primarily coffee and chocolate) can decrease or reverse fibrocystic breast changes.

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Paula Ford-Martin

Fibroids *see* **Uterine fibroids**

Fibromyalgia

Definition

Fibromyalgia is characterized by muscle **pain**, **fatigue**, and multiple tender points on the body. Many individuals with fibromyalgia describe the symptoms as similar to the aches and pains of a severe case of the flu. Fibrositis, fibromyalgia, and fibromyositis are names given to a set of symptoms believed to be caused by the same general problem.

Description

Fibromyalgia is more common than previously thought. According to the American College of Rheumatology, as many as 2–4% of the U.S. population may be affected by the disorder. Fibromyalgia is more prevalent in adults than children, with more women affected than men, particularly women of childbearing age.

Causes and symptoms

The exact cause of fibromyalgia is not known. Sometimes it occurs in several members of a family, suggesting that it may be an inherited disorder. Researchers have investigated a number of possible causes, including genetic causes, **sleep disorders**, specific injuries, **infections**, problems with muscle metabolism, problems with the neurons that transmit information about pain, and nervous system abnormalities. It is often difficult for research to determine if a specific problem, such as sleep disturbances, results from fibromyalgia or are a possible cause of the

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condition. It is likely that a number of factors must occur in combination to cause fibromyalgia.

Pain is the major symptom with aches, tenderness, and stiffness of multiple muscles, joints, and soft tissues. The pain may move from one part of the body to another. It is most common in the neck, shoulders, chest, arms, legs, hips, and back. Although the pain is present most of the time and may last for years, the severity of the pain may fluctuate.

Symptoms of fatigue may result from the individual's chronic pain coupled with **anxiety** about the problem and how to find relief. The inflammatory process also produces chemicals that are known to cause fatigue. Other common symptoms are tension headaches, difficulty swallowing, recurrent abdominal pain, **diarrhea**, and numbness or tingling of the extremities. **Stress**, anxiety, **depression**, or lack of sleep can increase symptoms. Intensity of symptoms is variable, ranging from gradual improvement to episodes of recurrent symptoms.

Diagnosis

Diagnosis is difficult and frequently missed because symptoms of fibromyalgia are vague and generalized. Coexisting nerve and muscle disorders such as **rheumatoid arthritis**, spinal arthritis, or **Lyme disease** may further complicate the diagnostic process. As of 2008, there were no tests available to specifically diagnose fibromyalgia. The diagnosis is usually made after ruling out other medical conditions with similar symptoms such as lupus and **hypothyroidism**.

Because of the emotional distress experienced by people with this condition and the influence of stress on the symptoms themselves, fibromyalgia has often been labeled a psychological problem. Although the debate about fibromyalgia continues, research on possible causes of the condition and public awareness campaigns have helped promote fibromyalgia's validity as a physiological problem.

The American College of Rheumatology has developed standards for fibromyalgia that healthcare practitioners can use to diagnose this condition. According to these standards, individuals can be diagnosed with fibromyalgia if they have widespread pain in combination with tenderness in at least 11 of the 18 sites known as trigger points. Trigger point sites include the base of the neck, along the backbone, in front of the hip and elbow, and at the rear of the knee and shoulder.

Treatment

As of 2008, there was no known cure for fibromyalgia. Therefore, the goal of treatment is successful symptom management. Treatment usually requires a combination of therapies, including medication, **exercise**, and lifestyle adjustments. On June 21, 2007, the U.S. Food and Drug Administration (FDA) approved the first drug to treat fibromyalgia. Although previously many doctors had prescribed a variety of medications intended to help reduce the symptoms of fibromyalgia, Lycria (pregabalin) was the first drug approved specifically for the treatment of fibromyalgia. Made by Pfizer, Lycria was already used to treat pain associated with nerve damage caused by diabetes, pain following **shingles**, and partial seizures. A study of 1,800 patients showed that Lycria was also effective in treating the pain associated with fibromyalgia in many people. Lycria was not found to be effective in everyone with fibromyalgia, however, and it can have side effects, including sleepiness, **dizziness**, weight gain, swelling of the feet and hands, blurred vision, and **dry mouth**.

In addition to treatment with medication there are many other ways of managing the symptoms of fibromyalgia. Adequate rest is essential, as is a healthy diet. The diet should include a large variety of fruits and vegetables, which provide the body with trace elements and minerals that are necessary for healthy muscles. Avoidance of stimulating foods or drinks (such as coffee) and medications such as decongestants prior to bedtime is advised. Individuals should have a clear understanding of their role in the recovery process because it determines the successful management of this condition.

Other treatments found to be helpful include heat and occasionally cold compress applications. A regular stretching program is often useful. Aerobic activities focusing on increasing the heart rate are the preferred forms of exercise over most other forms of exertion. Exercise programs need to include good warm-up and cool-down sessions, with special attention given to avoiding exercises causing joint pain. **Hydrotherapy** exercises (exercises in a pool or tub) may be useful in providing a low impact exercise environment while soothing muscle and joint pain.

Massage therapy can be helpful, especially when a family member is instructed on specific massage techniques to manage episodes of increased symptoms. Short sessions are most helpful as repetitious movement can aggravate the condition. Specific attention to mental health, including psychological treatment, may also be important, since depression may precede or accompany fibromyalgia. **Relaxation** exercises, **yoga**, **aromatherapy**, **guided imagery**, and other relaxation therapies can be useful in easing stress and promoting overall well-being. A Mayo Clinic study

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KEY TERMS

Connective tissue—Tissue that supports and binds other body tissue and parts.

Lyme disease—An acute recurrent inflammatory disease involving one or a few joints, believed to be transmitted by a tick-borne virus. The condition was originally described in the community of Lyme, Connecticut, but has also been reported in other parts of the United States and other countries. Knees and other large joints are most commonly involved with local inflammation and swelling.

Rheumatology—The study of disorders characterized by inflammation, degeneration of connective tissue, and related structures of the body. These disorders are sometimes collectively referred to as rheumatism.

released in 2006 found that **acupuncture** can be helpful in relieving the symptoms of fibromyalgia.

Herbalists and aromatherapists may recommend tub soaks or compresses with **lavender** (*Lavandula angustifolia*), **chamomile** (*Chamaemelum nobilis*), or **juniper** (*Juniperus communis*) to soothe muscle and joint pain.

Allopathic treatment

People with fibromyalgia often need a rheumatology consultation (a meeting with a doctor who specializes in disorders of the joints, muscles, and soft tissue) to decide the cause of various rheumatic symptoms, to be educated about fibromyalgia and its treatment, and to exclude other rheumatic diseases. A treatment program must be individualized to meet the patient's needs. The rheumatologist, as the team leader, enlists and coordinates the expertise of other health professionals in the care of the patient.

Expected results

Fibromyalgia is a chronic health problem. The symptoms sometimes improve and at other times worsen, but they often continue for months to years.

Prevention

There is no known or specific prevention for fibromyalgia. However, similar to many other medical conditions, remaining as healthy as possible with a good diet, safe exercise, and adequate rest is the best prevention.

Resources

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ORGANIZATIONS

American Pain Society, 4700 W. Lake Ave., Glenview, IL, 60025, (847) 375-4715, http://www.ampainsoc.org.

National Fibromyalgia Association, 2121 S. Towne Centre Place, Suite 300, Anaheim, CA, 92806, (714) 921-0150, http://www.fmaware.org.

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Fish oil

Description

Fish oils are derived from such cold-water fish as salmon, cod, tuna, or mackerel. They have recently acquired a new visibility as dietary supplements because they are high in **omega-3 fatty acids**. Omega-3 fatty acids, together with the **omega-6 fatty acids**, are important components of a healthful diet. The body cannot manufacture them, therefore, they must be obtained from grains, fruits, vegetable oils, and other foods. In addition, people should consume a balanced ratio of omega-6 and omega-3 fatty acids. Some researchers believe that these two types of fatty acids should be consumed in a 1:1 ratio, while others maintain that people should obtain several times more omega-3 than omega-6 fatty acids from their diet. In either case, the fact that fish oils are high in omega-3 fatty acids may help people to maintain a good balance between the two types of fatty acids.

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Fish oil capsules. *(Pulse Picture Library/CMP Images/ Phototake. Reproduced by permission.)*

The most important types of omega-3 fatty acids found in fish oils are eicosapentanoic acid (EPA) and docosahexaenoic acid (DHA). The body needs EPA to produce prostaglandins, which are hormone-like substances that help to protect the heart and the cell membranes. DHA is required for the normal development of the brain, the eyes, and the reproductive system.

General use

In general, fish oils are recommended as dietary supplements to lower the levels of triglycerides in the blood, counteract inflammation in various parts of the body, and thin the blood.

Heart disease and stroke

The omega-3 fatty acids in fish oils increase the concentrations of good **cholesterol** (high density lipoproteins, HDL) in the blood while decreasing the concentrations of bad cholesterol (triglycerides). They also lower the total cholesterol level. Furthermore, these omega-3 oils protect the heart by preventing the formation of **blood clots** and fatty deposits (plaque) on the arterial walls. In people with coronary **heart disease**, fish oils may help to reduce the risk of blood clots in the brain or in the lungs; **pain** associated with **angina**; and the risk of cardiac arrythmias.

The benefits of omega-3 fatty acids have been shown in clinical studies. Investigation of the possible benefits of fish oils began when researchers discovered that Eskimos rarely have heart attacks or **rheumatoid arthritis** (RA) even though their diet is high in fat from fish, seals, and whales. Because these sources of fat have a high omega-3 fatty acid content, it was assumed that the type of fatty acid that they contained helped to protect the Eskimos from the usual consequences of high-fat **diets**. Later studies confirmed that diets high in omega-3 fatty acids decrease the risk of heart attacks, strokes, and abnormal heart rhythms. In one study of 20,551 doctors, those who ate at least one fish meal per week cut their risk of heart attacks in half compared to those who ate fish once a month or less. In the five-year Lyon study, men who followed a **Mediterranean diet** with emphasis on omega-3-rich oils, fish, fruits, and vegetables had their **heart attack** rates reduced by 70% compared to subjects in the control group. One question, however, is whether fish oil used by itself as a dietary supplement is as effective as a diet high in fish, since the two are not the same. One open trial of 11,324 people who were followed for three to five years found that fish oil did reduce the risk of death from heart attack. This study, however, was not a double-blind study, and its results cannot be taken as conclusive.

High blood pressure

Fish oils may help to control high blood pressure. Several studies have shown that taking fish oil can lower blood pressure. On the other hand, a 1997 study involving 2,000 subjects found no significant effect.

Rheumatoid arthritis

Fish oil may be useful in managing the symptoms of early rheumatoid arthritis (RA). A significant reduction in joint tenderness, morning stiffness, and **fatigue**, coupled with an increase in grip strength, has been observed in patients taking fish oil capsules. Fish oil appears to reduce the symptoms of RA without side effects, and to increase the effectiveness of standard medications for it. Fish oil does not appear to slow the progress of RA.

Asthma

It has been claimed that fish oils reduce inflammation of the airways and may prevent **asthma** attacks. According to one author, allergic disorders such as asthma may be triggered by too much omega-6 and too little omega-3 fats in the diet. Two studies undertaken in 1994 and 1996 respectively found no benefits from using fish oil in the management of asthma.

Psoriasis and autoimmune disorders

Several small studies indicate that fish oil may be helpful in treating **psoriasis**, which is an inflammatory disorder of the skin; in lupus; and in Raynaud's

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phenomenon, an autoimmune disorder in which the patient's hands and feet are abnormally sensitive to cold and emotional **stress**. With respect to the Raynaud's patients, small double-blind studies showed that very high doses of fish oil reduce their responses to cold. It appears that doses as high as 12 g of fish oil daily are necessary to provide this effect. With respect to lupus, a small study of 30 subjects found that 14 out of 17 patients given daily doses of 20 g of EPA derived from fish oil had significant improvement. Subjects given a placebo either showed no improvement or got worse.

Osteoporosis

When taken together with **calcium**, **essential fatty acids** may help to protect women from **osteoporosis**. One 18-month study of 65 postmenopausal women found that those who were given a combination of omega-6 fatty acids (GLA) and omega-3 fatty acids from fish oil together with calcium had higher bone density and fewer **fractures** than those who were given the calcium and a placebo.

Gynecological problems

Fish oil supplements may be helpful in alleviating the symptoms of **premenstrual syndrome** (PMS) and painful periods. A number of different substances that are high in fatty acids, including **flaxseed** oil and GLA as well as fish oil, have been recommended for painful menstrual periods. One four-month study of adolescents suggests that fish oil is useful in treating this condition. Forty-two young women were divided into two groups; half received a daily dose of 6 g of fish oil for two months, followed by two months of placebo. The other half received the placebo and fish oil in reverse order. The results indicated that the subjects had significantly less menstrual pain while taking the fish oil.

Bipolar disorder and depression

Fish oil does appear to offer considerable benefits to people with **bipolar disorder**. A four-month double-blind study of 30 subjects indicated that fish oil improves emotional stability and helps to prevent relapses. Of the 14 persons who took fish oil, 11 stayed well or improved, while only six out of 16 subjects given placebos stayed well. A 2001 report looked at the effects of fish oil on mood and **depression**. Two large studies showed a strong connection between rates of depression and bipolar disorder in countries with high amounts of fish in diets. Although researchers cannot say that fish oil is the only reason for the difference, evidence continues to mount that omega-3 and omega-6 fatty acids may work as mood stabilizers.

Other conditions

Fish oil has been touted as a useful treatment for diabetic neuropathy, **allergies**, migraine headaches, **Crohn's disease**, **gout**, and ulcerative **colitis**, but there has been little systematic research involving these applications. In addition, health food manufacturers list **hair loss**, memory problems, muscle strain, failing eyesight, liver complaints, rickets, and dental problems as ailments that can be treated with fish oil. No clinical studies have been cited in support of these claims.

Early studies in laboratories indicate that fish oils might prolong life in people with automimmune disorders like diabetes. Early results show that a diet high in fish oils helped improve immune system function in these patients.

Preparations

There is no minimum daily requirement of fish oil as such, but a healthy diet should supply at least 5 g of essential fatty acids every day. Typical doses of fish oil are 3–9 g daily, although some participants in research studies have taken much higher doses. If fish oil is taken as a dietary supplement, it should be taken in large enough doses to supply about 1.8 g of EPA and 0.9 g of DHA on a daily basis. Fish oil capsules are available in health food stores as over-the-counter items; prices range from $7 for 180 capsules of Norwegian cod liver oil to $14 for 180 capsules of salmon oil. Capsules of tuna oil and halibut liver oil are also available from several commercial suppliers.

Precautions

Fish oil can easily become rancid. The capsules can be stored in the refrigerator to slow the rate of oxidation. Another option is to purchase capsules that have added **vitamin E**.

The type of fish oil may make a difference. Although cod liver oil is the easiest form to obtain, it can cause a buildup of **vitamin A** and **vitamin D** in the body because these two vitamins are fat-soluble. Pregnant women should not take more than 2,500 IU of vitamin A per day because higher amounts can cause birth defects. Other adults should not consume more than 5,000 IU of vitamin A per day. Vitamin D can produce toxicity when taken at levels above 1,000 IU daily for long periods of time. Persons who obtain their fish oil from cod liver oil should check the label to see how much vitamin A and vitamin D it contains.

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KEY TERMS

Essential fatty acid (EFA)—A fatty acid that the body cannot make but must obtain from the diet. EFAs include omega-6 fatty acids found in primrose and safflower oils, and omega-3 fatty acids oils found in fatty fish and flaxseed, canola, soybean, and walnuts.

Prostaglandins—Hormone-like substances that the body produces from essential fatty acids. Prostaglandins control the contraction of smooth muscle, body temperature, and many other processes.

Raynaud's disease—A vascular disorder in which the patient's fingers ache and tingle after exposure to cold or emotional stress, with characteristic color changes from white to blue to red. Raynaud's phenomenon may be seen in scleroderma and systemic lupus erythematosus.

It may be prudent to take salmon oil, mackerel oil, or oil from other coldwater fish.

Women who are pregnant or breastfeeding should talk to their physicians before taking fish oil supplements or any other medications.

Because fish oil can thin the blood, it should not be taken together with aspirin and other nonsteroidal anti-inflammatory drugs (NSAIDs, or over-the-counter pain killers), Coumadin (warfarin), or other anti-clotting medications. Fish oil does not seem to cause problems with bleeding when it is taken by itself, however.

Side effects

Fish oil generally appears to be safe when taken as a dietary supplement. The most common side effects are mild **indigestion** or a fishy taste in the mouth.

Interactions

Fish oil supplements may interact with nonsteroidal anti-inflammatory drugs (NSAIDs), warfarin, or other anti-clotting medications to cause excessive bleeding.

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ORGANIZATIONS

American Association of Naturopathic Physicians (AANP). 8201 Greensboro Drive, Suite 300, McLean, VA 22102. (703) 610-9037. http://www.naturopathic.org.

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5-Hydroxytryptophan *see* **5-HTP**

5-HTP

Description

5-HTP is the acronym for 5-hydroxytryptophan, also called 5-hydroxy-L-tryptophan. 5-HTP is found primarily in the brain. This compound is made from tryptophan, a natural amino acid found in foods. Tryptophan is an essential amino acid, which means that it cannot be made by the body; it must be obtained from food, particularly proteins. In the liver and brain, 5-HTP is converted to an important monoamine neurotransmitter called serotonin. Neurotransmitters are chemical messengers that transmit signals between neurons (nerve cells).

Taking 5-HTP increases the body's supply of the compound, which leads to higher serotonin levels in the brain. Serotonin, also called 5-hydroxytryptamine or 5-HT, plays an important role in controlling behavior and moods. It influences many normal brain activities and also regulates the activity of other neurotransmitters. Having adequate levels of serotonin instills a feeling of **relaxation**, calm, and mild euphoria (extreme happiness). Low levels of serotonin, serotonin deficiency syndrome, leads to **depression**, **anxiety**, irritability, **insomnia**, and many other problems.

Conditions associated with low levels of serotonin include:

- anxiety
- attention deficit hyperactivity disorder (ADHD)
- bulimia
- depression
- epilepsy
- fibromyalgia

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- headaches
- hyperactivity
- insomnia
- obesity
- obsessive compulsive disorder (OCD)
- panic attacks
- premenstrual syndrome (PMS)
- schizophrenia
- seasonal affective disorder (SAD)

5-HTP has other effects on the body. It is an antioxidant that protects the body from damage by substances called free radicals (unstable, toxic molecules). In this role, 5-HTP may help slow the **aging** process and protect the body from illness. Because serotonin is used to make **melatonin**, taking 5-HTP may help achieve some of the same benefits as melatonin, such as treating **jet lag**, depression, and insomnia. There is some evidence that 5-HTP can replenish the supply of the pain-relieving molecules called endorphins. Studies have shown that low levels of endorphins are associated with **chronic fatigue syndrome**, **fibromyalgia**, **stress**, and depression. In addition, 5-HTP affects other neurotransmitters, including norepinephrine and dopamine.

General use

In studies, 5-HTP has been proven effective in the treatment of carbohydrate cravings and binge eating, chronic headaches, depression, fibromyalgia, insomnia, anxiety, and panic disorders.

Much of the clinical research with 5-HTP focused on the treatment of depression. In 15 separate studies, 5-HTP was tested on a total of 511 patients with different kinds of depression. Over half (56%) of these patients had significant improvement in depression while taking 5-HTP. The compound was found to be as effective as the selective serotonin reuptake inhibitor (SSRI) fluvoxamine and the tricyclic antidepressants, chloripramine and imipramine. Many of these studies used relatively high doses ranging from 50–3,250 mg daily.

Three clinical studies found that 5-HTP can significantly improve the **pain**, anxiety, morning stiffness, and **fatigue** associated with fibromyalgia. The doses ranged from 300–400 mg daily. In one study, 5-HTP treatment was as effective as a tricyclic antidepressant (amitriptyline) and monamine oxidase inhibitors (MAOI; pargilyne or phenelzine).

Three clinical studies found that 5-HTP use led to decreased intake of food and subsequent weight loss in obese patients. The dose used in one study was 900 mg daily, which initially caused **nausea** in 80% of the patients.

A few clinical trials have found that 5-HTP can effectively prevent chronic headaches, including **migraine headache** and tension **headache**. In addition, 5-HTP compared favorably with propranolol and methysergide, drugs commonly used to prevent migraines.

In treating insomnia, 5-HTP is effective because it increases the length of rapid eye movement (REM) sleep, which improves sleep quality.

The symptoms of anxiety may be significantly reduced by 5-HTP. In studies, it instilled a sense of relief in patients with panic disorders.

Other conditions that may be treated with 5-HTP, but for which no studies exist, include chronic fatigue syndrome, **premenstrual syndrome**, **Parkinson's disease**, and seizure disorders (such as **epilepsy**).

Although 5-HTP may be a useful alternative to conventional antidepressant drugs, one study indicated that it may be of no value for patients who have failed to respond to traditional drugs. In this study, patients who failed to respond to tricyclic antidepressants were treated with either 5-HTP or a monoamine oxidase inhibitor (MAOI). Half of the patients improved with the MAOI treatment, while none showed any benefit from 5-HTP treatment.

Some uncertainty remained about the efficacy of 5-HTP. In reviewing the evidence about the use of 5-HTP in 2008, the Internet source SupplementWatch.com concluded that "The overall scientific evidence for the effectiveness of 5-HTP is not very strong."

Preparations

The 5-HTP preparation available commercially is isolated from the seed of an African plant called *Griffonia simplicifolia*. It is available as an enteric coated tablet, which does not break down until it reaches the intestine.

The recommended starting dose for headaches, weight loss, depression, and fibromyalgia is 50 mg three times daily. It can be taken with food. However, for weight loss it should be taken 20 minutes before eating. If it is not effective after two weeks, the dose may be increased to 100 mg three times daily, but only with the recommendation of a physician. Insomnia is treated with 25 mg (which may be increased to 100 mg after a few days) taken 30–45 minutes before bedtime.

Precautions

The Mayo Clinic detected, and the U. S. Federal Drug Administration (FDA) confirmed, the presence of a contaminant (peak X) in 5-HTP produced by six different manufacturers. This contaminant is similar

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KEY TERMS

Eosinophilia myalgia syndrome (EMS)—A chronic, painful disease of the immune system that causes joint pain, fatigue, shortness of breath, and swelling of the arms and legs. EMS can be fatal.

Monoamine oxidase inhibitor (MAOI)—An antidepressant drug that prevents the breakdown of monoamine neurotransmitters (such as serotonin) in the gaps between nerve cells. Nardil and Parnate are common MAOI brands.

Neurotransmitter—A chemical messenger that transmits signals between nerve cells.

Selective serotonin reuptake inhibitor (SSRI)—A family of antidepressant drugs that block the reabsorption of serotonin by nerve cells. Prozac, Zoloft, and Paxil are common brand names for these drugs.

Serotonin syndrome—A syndrome characterized by agitation, confusion, delirium, and perspiration, which is caused by high levels of serotonin in the brain.

Tricyclic antidepressant (TCA)—A group of antidepressant drugs that all have three rings in their chemical structure. Their mechanism of action is not fully understood, but they appear to extend the duration of action of some neurohormones, including serotonin and norepinephrine. They have also been used to treat some forms of chronic pain. Common brand names are Aventyl, Elavil, Surmontil, and Vivactil.

to one found in L-tryptophan, which in 1989 caused the potentially fatal eosinophilia myalgia syndrome (EMS) in some persons. The L-tryptophan supplements were subsequently banned by the FDA. There have been 10 reports of EMS associated with 5-HTP use. The 5-HTP contaminant was not at levels high enough to cause illness. However, taking excessive doses of 5-HTP may lead to toxic levels of peak X.

Long-term studies on the safety of 5-HTP use had not been conducted as of 2008. To be safe, 5-HTP should be considered a short-term remedy.

Pregnant women should not take 5-HTP because there are no clinical studies on the compound's use among this population.

Side effects

Side effects associated with 5-HTP are rare but may include headaches, mild **stomachaches**, nausea, nasal congestion, and **constipation**. There are anecdotal reports that taking high doses of 5-HTP causes nightmares or vivid dreams. Side effects may be minimized by starting with a low dose of 5-HTP and taking it with food.

Interactions

It is theorized that the effectiveness of 5-HTP may be enhanced by taking vitamin B_6 and niacinamide. The action of 5-HTP may be enhanced by extracts of **ginger**, **passionflower** (*Passiflora incarnata*), **St. John's wort**, and *Ginkgo biloba*.

Dopa-decarboxylase inhibitors, such as carbidopa or benserazide block the enzyme that is responsible for the destruction of dopamine. A study by the Massachusetts College of Pharmacy and Health Sciences demonstrated that 5-HTP reaches the brain without the use of a dopa-decarboxylase inhibitor and will produce the benefits of stress reduction and reduced food intake even when used alone.

There is a chance of developing serotonin syndrome when taking 5-HTP with an antidepressant drug. Serotonin syndrome was seen in patients taking high doses (greater than 1,200 mg daily) of L-tryptophan and MAOIs. Combining 5-HTP with a MAOI or selective serotonin reuptake inhibitor antidepressant should be done with caution, under the supervision of a physician.

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Flatulence *see* **Gas**

Flavonoids *see* **Bioflavonoids**

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Flaxseed

Description

Flaxseed (also called linseed) comes from the flax plant (*Linum usitatissimum*), which belongs to the Linaceae plant family. The flax plant is a small, single-stemmed annual that grows to about 2 ft (0.6 m) tall and has grayish green leaves and sky blue flowers. Flax has been cultivated for thousands of years. Linen made from flax has been found in the tombs of Egyptian pharaohs and is referred to in the Bible and in Homer's *Odyssey*. The Roman naturalist Pliny wrote about the laxative and therapeutic powers of flax in the first century A.D., and many authorities believe it has been used as a folk remedy since ancient times. Flax is believed to be native to Egypt, but its origins are questionable since it has been used widely around the world. It is cultivated in many places, including Europe, South America, Asia, and parts of the United States. Only the seeds (flaxseed) and oil of the flax plant (flaxseed oil) are used medicinally. Linseed oil is the term usually used for the oil found in polishes, varnishes, and paints.

Flaxseed oil is derived from the flax plant's crushed seeds, which resemble common sesame seeds but are darker. The amber oil is very rich in a type of fat called alpha-linolenic acid (ALA), an omega-3 fatty acid that is good for the heart and found in certain plants. High amounts of **omega-3 fatty acids** are found in fish and smaller amounts are found in green leafy vegetables, soy-derived foods, and nuts. Many doctors consider these acids important for cardiovascular health. Studies suggest that they can lower triglyceride levels and reduce blood pressure. Omega-3 fatty acids may also decrease the risk of heart attacks and strokes by preventing the formation of dangerous **blood clots**. In high dosages, the fatty acids may help to alleviate arthritis, though flaxseed products have not yet been shown to be effective for this purpose. The National Center for Complimentary and Alternative Medicine (NCCAM) funded a study on the effects of flaxseed on high **cholesterol** levels and in the prevention of **heart disease** and **osteoporosis**.

In addition to omega-3 fatty acids, flaxseed products also contain potentially therapeutic chemicals called lignans. Flaxseed contains from 100 to 800 times more lignans than any other plant. Lignans are believed to have antioxidant properties and may also act as phytoestrogens, very weak forms of estrogen found in fruits, vegetables, whole grains, and beans. Unlike human estrogen, phytoestrogens have dual properties: They can mimic the effects of the hormone in some parts of the body while blocking its effects in others. Many herbalists believe that phytoestrogens can be useful in the prevention or treatment of a variety of diseases, including **cancer**, cardiovascular disease, and osteoporosis. The estrogen-blocking effects of phytoestrogens may be particularly effective at combating certain cancers that depend on hormones, such as cancers of the breast or uterus. Women who consume large amounts of lignans appear to have lower rates of **breast cancer**. The fact that heart disease and certain cancers occur less frequently in Asian countries is sometimes attributed to a diet rich in plant foods containing phytoestrogens.

General use

While not approved by the United States Food and Drug Administration (FDA), flaxseed products are reputed to have a number of beneficial effects. Flaxseed is sometimes referred to as a nutraceutical, a term that includes any food or food ingredient thought to confer health benefits, including preventing and treating disease. In the late twentieth century and early 2000s, the omega-3 fatty acids derived from flaxseed and other sources became an important food additive. Omega-3 is included in cereals, eggs (derived from hens on a flaxseed-enhanced diet), orange juice, and even in pet foods. Since 2006, as many as 250 food products have added the fatty acid Omega-3 as a nutritional boost. Several studies, some conducted in people, suggest that flaxseed products (or agents contained in them) may help to keep the heart and cardiovascular system healthy. Flaxseed products may lower cholesterol levels, help control blood pressure, and may reduce the buildup of plaque in arteries. Test tube and rat studies suggest that chemicals in flaxseed may help to prevent or shrink cancerous tumors. Due to its estrogen-like effects, some women use flaxseed oil to ease breast tenderness, alleviate symptoms of **premenstrual syndrome** (PMS), and help control menopausal symptoms. Flaxseed oil has also been recommended to treat skin conditions, inflammation, and arthritis. It is usually taken internally for all the purposes mentioned above. The oil may be used externally to help the healing of scalds and **burns**.

Additionally, flaxseed has been shown to be beneficial for people suffering from digestive disorders. It is recommended as an "effective herbal agent" for treating **irritable bowel syndrome** (IBS).

Clinical studies

The link between flaxseed and heart disease has been examined in a number of published studies. One of these studies published in the journal *Atherosclerosis*

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in 1997, observed the effects of adding flaxseed to the diet of rabbits with **atherosclerosis**. Researchers found that flaxseed reduced the development of plaque build-up by almost 50%. The authors concluded that flaxseed may help to prevent heart attacks and strokes related to high cholesterol levels. However, a 2002 clinical trial on postmenopausal women concluded that the evidence remained "indeterminate," as to the effectiveness of dietary flaxseed for chloresteral reduction.

A study at the University of Toronto, reported in Clinical Cancer Research in 2005, concluded that dietary flaxseed has the potential to reduce tumor growth in patients with breast cancer. The clinical trial consisted of a randomized, double-bind, placebo controlled study on a small group of postmenopausal patients with newly diagnosed breast cancer. Participants ingested either a 25 g flaxseed-containing muffin or a (placebo) muffin, without the flaxseed. Researchers reported that the results of the clinical trial agreeed with previous clinical and preclinical studies showing antitumor effects of flaxseed in **prostate cancer** patients and in laboratory animal studies with carcinogen-treated rats.

Though early animal research and small clinical trials with people suggest that flaxseed has the potential as a dietary cancer fighter and a useful nutritional aid in preventing the spread of cancer, a review of 38 studies conducted between 1966 and 2005, reported in 2006 in the *Journal of the American Medical Association* suggests that omega-3s (found in abundance in flaxseed and in many kinds of fish) "have no significant effect" on cancers of the breast, colon, lung and prostate, according to Dr. Catherine MacLean, lead author of the study and a researcher at the Rand Corp.

While the cancer-inhibiting effects of flaxseed in people may be in doubt, some practitioners of alternative medicine continue to recommend the herb as a healthy dietary choice.

The American Institute for Cancer Research reported in 2006 on a study at the University of Pennsylvania examining the role of flaxseed in preventing oxidative lung tissue damage, a side effect of irradiation used in treating **lung cancer**. Early in the first year of a two-year study with mice, flaxseed-treated mice showed a "major increase in survival rates and decrease in lung tissue oxidative damage after radiation," according to the principal investigator in the study.

The therapeutic effects of flaxseed are not limited to people, according to some authorities. Flaxseed is sometimes used as a purgative in horses and sheep. In addition, flaxseed is included in a rapidly expanding list of nutraceutical products for dogs, cats, and other domestic pets. In 2006, the U.S. Department of Agriculture approved Canadian "Omega-3 pork" for sale in U.S. supermarkets. Canadian Omega-3 pork is derived from enhancing the animal feed with flaxseed.

Preparations

Flaxseed products are commercially available as whole or ground seeds, gelatin capsules, and oil. Some herbalists recommend adding the ground or whole seeds to the diet to get the maximum benefit from the herb. Nutritionists advise that the healthy fiber, protein, and lignans of flaxseed are only found in the milled seed and defatted ground flax, though some manufacturers of flaxseed oil return particulate matter containing lignans to the oil. Whole seeds can be stored in a cool, dry place for up to one year. Crushed seeds should be used immediately or frozen for future use. No standard guidelines have been established on how much of these forms should be consumed. Research subjects have been given as much as 1/4 cup of ground flaxseed per day, but a Canadian **nutrition** expert suggests that 1–2 tablespoons per day is enough for most adults.

Several nutraceutical companies have marketed a flaxseed ingredient. The flaxseed ingredient is a fine-milled flour with 5% lignan content, intended for addition to commercial baked goods, snack foods, cereals, dry pet foods, and similar products.

Capsules can be taken according to package directions. Some herbalists believe that the capsules available are highly processed, contain fewer beneficial properties, and may be an expensive alternative to flaxseed oil.

The optimum daily dosage of flaxseed oil has not been established. Usually, 1 tablespoon daily of the oil can be taken for general health. As a remedy, 1–3 tablespoons may be taken daily based on the person's weight and health needs. Some people consume the oil as an ingredient in salad dressing. The oil is often combined with limewater when used to treat burns and scalds.

Precautions

Flaxseed products are not known to be harmful when taken in recommended dosages, though it is important to remember that the long-term effects of taking flax-derived remedies (in any amount) have not been studied as of 2008. Due to lack of sufficient medical study, flaxseed products should be used with caution in children, women who are pregnant or breastfeeding, and people with liver or kidney disease.

Because flaxseed oil tends to become rancid relatively quickly, it should be kept in the refrigerator.

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KEY TERMS

Antioxidant—An agent that helps to protect cells from damage caused by free radicals, the destructive fragments of oxygen produced as a byproduct during normal metabolic processes.

Atherosclerosis—Narrowing and hardening of the arteries due to plaque buildup.

Nonsteroidal anti-inflammatory drugs (NSAIDs)—A group of pain-relieving medications that also reduce inflammation when used over a period of time. NSAIDs are often given to patients with osteoarthritis.

Nutraceutical—Any food or food ingredient that is thought to provide health benefits, including the prevention and treatment of disease. Flaxseed is considered a nutraceutical.

Osteoporosis—An age-related disease in which bones become fragile and prone to debilitating fractures.

Purgative—A substance that encourages bowel movements.

Triglyceride—The total amount of fat in the blood. Triglyceride should not be confused with cholesterol, which is technically classified as a steroid and not as a fat.

While the oil may be added to cooked food, it should not be used during cooking because heat can destroy the effectiveness of the oil.

Persons who are adding ground flaxseed to their diet for its fiber content are advised to start off with small amounts and increase them gradually and to drink plenty of water. Otherwise the high fiber content of flaxseed can produce intestinal cramping and **diarrhea**.

Consumers should read the labels of all flaxseed products to insure that the product is for medicinal or nutritional purposes.

Side effects

When taken in recommended dosages, flaxseed products are not associated with any significant side effects.

Interactions

Consumers should consult their healthcare professional for information on flaxseed products and interactions with medications and other remedies. More specifically, the omega-3 fatty acids in flaxseed may increase the blood-thinning effects of such medications as aspirin or warfarin. Flaxseed may help a group of medications known as statins (lovastatin, simvastatin, etc.), which are given to lower blood cholesterol, to work more effectively.

Flaxseed may help to reduce the toxic side effects (kidney damage and high blood pressure) of cyclosporine, which is a drug given to organ transplant patients to prevent rejection of the new organ.

Flaxseed appears to reduce the risk of ulcers from high doses of NSAIDs.

In general, flaxseed oil should not be taken at the same time of day as prescription medications or other dietary supplements, as it will slow down the body's absorption of them.

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American Botanical Council, P.O. Box 144345, Austin, TX, 78714-4345, http://www.herbalgram.org.

National Center for complimentary and Alternative Medicine (NCCAM), National Institutes of Health, 9000 Rockville Pike, Bethesda, MD, 20892, http://www.nccam.nih.gov.

United States Food and Drug Administration (FDA), Center for Food Safety and Applied Nutrition, 5100 Paint Branch Parkway, College Park, MD, 20740, (888) SAFEFOOD, http://www.cfsan.fda.gov.

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Flower remedies

Definition

Flower remedies are specially prepared flower essences, containing the healing energy of plants. They are prescribed according to a patient's emotional disposition, as ascertained by the therapist, doctor, or patients themselves.

Origins

Perhaps the most famous and widely used system is the Bach flower remedies. This system originated in the 1920s when British physician and bacteriologist, Dr. Edward Bach (1886–1936), noticed that patients with physical complaints often seemed to be suffering from **anxiety** or some kind of negative emotion. He concluded that assessing a patient's emotional disposition and prescribing an appropriate flower essence could treat the physical illness. Bach was a qualified medical doctor, but he also practiced **homeopathy**.

As a result of his own serious illness in 1917, Bach began a search for a new and simple system of medicine that would treat the whole person. In 1930, he gave up his flourishing practice on Harley Street at the Royal London Homeopathic Hospital and moved to the countryside to devote his life to this research. It is known that at this point, he ceased to dispense the mixture of homeopathy and allopathic medicine that he had been using. Instead, he began investigating the healing properties of plant essences and discovered that he possessed an "intuition" for judging the properties of each flower. Accordingly, he developed the system of treatment that bears his name, and is also the foundation for all other flower-remedy systems.

The Bach Flower Remedies were ostensibly the only system of significance from the 1920s until in the 1970s, when there was a renewed interest in the subject by doctors working in the field of natural medicine. Perhaps the most notable was Dr. Richard Katz, who was seeking new methods of dealing with modern **stress** and the resulting ailments. He focused on the concept of a psychic, psychological effect and chose to pursue this line of research.

In 1979, Katz founded the Flower Essence Society in California, (FES). This society pledged to further the research and development of Bach's principles. FES hosts a database of over 100 flower essences from more than 50 countries. FES is now an international organization of health practitioners, researchers, students, and others concerned with flower essence therapy.

The Society has connections with an estimated 50,000 active practitioners from around the world, who use flower essence therapy as part of their treatment. FES encourages the study of the plants themselves to determine the characteristics of flower essences. They are compiling an extensive database of case studies and practitioner reports of the use of essences therapeutically, allowing verification and development of the original definitions. They are also engaged in the scientific study of flower essence therapy.

FES says they have developed the theories of Paracelsus and Goethe who researched the "signatures" and "gestures" of botanical specimens, on the premise that the human body and soul are a reflection of the system of nature. FES plant research interprets the therapeutic properties of flower essences according to these insights.

In this regard, they have devised 12 "windows of perception" for monitoring the attributes of plants. Each of these windows reveals an aspect of the plant's qualities, although they maintain that what they are seeking is a "whole which is greater than the sum of its parts." The 12 windows are not considered independent classifications, but more of a blended tapestry of views of the qualities that each plant possesses.

The first window is concerned with the "form" of a plant—its shape classification. The second focuses on its "gesture" or spatial relationship. The third window is a plant's botanical classification; the Flower Essence Society maintains that considering a plant's botanical family is essential to obtaining an overview of its properties as a flower essence. The fourth window concerns the time orientation of a particular specimen regarding the daily and seasonal cycles. Why do some flowers bloom at different times of the day, while others, such as the evening primrose, respond to the moon? The fifth window observes a plant's relationship to its environment. Where a plant chooses to grow, and where it cannot survive, reveals much about its qualities. The sixth window observes a plant's relationship to the Four Elements and the Four Ethers, as FES maintains that plants exist in one of the elemental or etheric forces in addition to their physical life. "Elements" refers to those developed by the Greeks, as opposed to the modern concept of "molecular building blocks." It seems that commonly, two elements predominate in a plant, indicating a polarity of qualities, while two can be said to be recessive. The seventh window relates to a plant's relationship with the other kingdoms of nature: mineral, animal and human, while the eighth relates to the color and color variations of a plant. Katz explains

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Bach flower remedies

Name	Remedy For
Agrimony	Upset by arguments, nonconfrontational, conceals worry and pain
Aspen	Fear of the unknown, anxiety, prone to nightmares, and apprehension
Beech	Critical, intolerant, and negative
Centaury	Submissive and weak-willed
Cerato	Self doubting and overly dependent
Cherry plum	Emotional thoughts and desperation
Chestnut bud	Repeats mistakes and has no hindsight
Chicory	Selfish, controlling, attention-seeking and possessive
Clematis	Absorbed, impractical, and indifferent
Crab apple	Shame and self-loathing, cleansing remedy
Elm	Overwhelmed by responsibility and feelings of inadequacy
Gentian	Negative, doubt, and depression
Gorse	Pessimism, hopelessness, and despair
Heather	Self-centered and self-absorbed
Holly	Jealousy, hatred, suspicion, and envy
Honeysuckle	Homesick, living in the past, and nostalgic
Hornbeam	Procrastination, fatigue, and mental exhaustion
Impatiens	Impatience, irritability, and impulsivity
Larch	No confidence, inferiority complex, and despondency
Mimulus	Timid, shy, and fear of the known
Mustard	Sadness and depression of unknown origin
Oak	Obstinate, inflexible, and overachieving
Olive	Exhaustion (following mental or physical effort)
Pine	Guilt and self blame
Red chestnut	Fear and anxiety for loved ones
Rock rose	Nightmares, hysteria, terror, and panic
Rock water	Obsessive, repression, perfectionism, and self denial
Scleranthus	Indecision, low mental clarity, and confusion
Star-of-Bethlehem	Grief and distress, shock
Sweet chestnut	Despair and hopelessness
Vervain	Overbearing and fanatical
Vine	Arrogant, ruthless, and inflexible
Walnut	Difficulty accepting change
Water violet	Pride and aloofness
White chestnut	Worry, preoccupation, and unwanted thoughts
Wild oat	Dissatisfaction and uncertainty over one's directing in life
Wild rose	Apathy and resignation, drifting
Willow	Self pity and bitterness

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KEY TERMS

Aura—Emanation of light from living things (plants and animals) that can be recorded by Kirlian photography.

Essence—The constituent of a plant that determines its characteristics.

Potentization—The process of transferring the healing energy of a plant into spring water.

Window—A perspective adopted to assess the property of a given plant.

how the language of color tells us so much about the "soul qualities" of a plant. The ninth window concerns all other sensory perceptions of a plant, such as fragrance, texture, and taste. The tenth window involves assessing the chemical substances and properties; the eleventh studies medicinal and herbal uses, as by studying the physical healing properties of plants, their more subtle effects on the soul can be understood. Finally, the twelfth window involves the study of the lore, mythology, folk wisdom, and spiritual and ritual qualities associated with a particular plant. Katz relates how in the past, human beings were more in touch with the natural world, and the remnants of this unconscious plant wisdom live on in the form of folklore, mythology, and so on.

Benefits

Flower remedies are more homeopathic than herbal in the way they work, effecting energy levels rather than chemical balances. They have been described as "liquid energy." The theory is that they encapsulate the flowers' healing energy, and are said to deal with and overcome negative emotions, and so relieve blockages in the flow of human energy that can cause illness.

Description

Because flower remedies operate on approximately the same principles as homeopathy, practitioners quite often prescribe the two therapies in conjunction with each other. They can also be used concurrently with allopathic medicine.

The system consists of 38 remedies, each for a different disposition. The basic theory is that if the remedy for the correct disposition is chosen, the physical illness resulting from the present emotional state can then be cured. There is a **rescue remedy** made up of five of the essences—cherry plum, clematis, impatiens, rock star, and star of Bethlehem—that is recommended for the treatment of any kind of physical or emotional shock. Therapists recommended that rescue remedy be kept on hand to help with all emergencies.

The 38 Bach Remedies are:

- agrimony: puts on a cheerful front, hides true feelings, and worries or problems
- aspen: feelings of apprehension, dark foreboding, and premonitions
- beech: critical, intolerant, picky
- centaury: easily comes under the influence of others, weak-willed
- cerato: unsure, no confidence in own judgement, intuition, and seeks approval from others
- cherry plum: phobic, fear of being out of control, and tension
- chestnut bud: repeats mistakes, does not learn from experience
- chicory: self-centered, possessive, clingy, demanding, self pity
- clematis: absent minded, dreamy, apathetic, and lack of connection with reality
- crab apple: a "cleanser" for prudishness, self–disgust, feeling unclean
- elm: a sense of being temporarily overwhelmed in people who are usually capable and in control
- gentian: discouraged, doubting, despondent
- gorse: feelings of pessimism, accepting defeat
- heather: need for company, talks about self, and concentrates on own problems
- holly: jealousy, envy, suspicion, anger, and hatred
- honeysuckle: reluctance to enter the present and let the past go
- hornbeam: reluctant to face a new day, weary, can't cope (mental fatigue)
- impatiens: impatience, always in a hurry, and resentful of constraints
- larch: feelings of inadequacy and apprehension, lack of confidence and will to succeed
- mimulus: fearful of specific things, shy, and timid
- mustard: beset by "dark cloud" and gloom for no apparent reason
- oak: courageous, persevering, naturally strong but temporarily overcome by difficulties
- olive: for physical and mental renewal, to overcome exhaustion from problems of long–standing
- pine: for self–reproach, always apologizing, assuming guilt
- red chestnut: constant worry and concern for others

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EDWARD BACH (1886–1936)

Edward Bach was a graduate of University College Hospital (M.B., B.S., M.R.C.S.) in England. He left his flourishing Harley Street practice in favor of homeopathy, seeking a more natural system of healing than allopathic medicine. He concluded that healing should be as simple and natural as the development of plants, which were nourished and given healing properties by earth, air, water, and sun.

Bach believed that he could sense the individual healing properties of flowers by placing his hands over the petals. His remedies were prepared by floating summer flowers in a bowl of clear stream water exposed to sunlight for three hours.

He developed 38 remedies, one for each of the negative states of mind suffered by human beings, which he classified under seven group headings: fear, uncertainty, insufficient interest in present circumstances, loneliness, over-sensitivity to influences and ideas, despondency or despair, and overcare for the welfare of others. The Bach remedies can be prescribed for plants, animals, and other living creatures as well as human beings.

- rock rose: panic, intense alarm, dread, horror
- rock water: rigid–minded, self–denial, restriction
- scleranthus: indecision, uncertainty, fluctuating moods
- star of Bethlehem: consoling, following shock or grief or serious news
- sweet chestnut: desolation, despair, bleak outlook
- vervain: insistent, fanatical, over–enthusiastic
- vine: dominating, overbearing, autocratic, tyrannical
- walnut: protects during a period of adjustment or vulnerability
- water violet: proud, aloof, reserved, enjoys being alone
- white chestnut: preoccupation with worry, unwanted thoughts
- wild oat: drifting, lack of direction in life
- wild rose: apathy, resignation, no point in life
- willow bitter: resentful, dissatisfied, feeling life is unfair

Originally, Bach collected the dew from chosen flowers by hand to provide his patients with the required remedy. This became impractical when his treatment became so popular that production could not keep up with demand. He then set about finding a way to manufacture the remedies, and found that floating the freshly picked petals on the surface of spring water in a glass bowl and leaving them in strong sunlight for three hours produced the desired effect. Therapists explain that the water is "potentized" by the essence of the flowers. The potentized water can then be bottled and sold. For more woody specimens, the procedure is to boil them in a sterilized pan of water for 30 minutes. These two methods produce "mother tinctures" and the same two methods devised by Bach are still used today. Flower essences do not contain any artificial chemical substances, except for alcohol preservative.

Bach remedies cost around $10 each, and there is no set time limit for treatment. It may take days, weeks, or in some cases months. Flower essences cost around $6 each, and there is also no set time for the length of treatment, or the amount of essences that may be taken. These treatments are not generally covered by medical insurance.

Precautions

Bach remedies and flower essences are not difficult to understand, and are considered suitable for self administration. The only difficulty may be in finding the correct remedy, as it can sometimes be tricky to pinpoint an individual's emotional disposition. They are even safe for babies, children, and animals. An important aspect of treatment with flower remedies, is that if you feel instinctively that you need a particular remedy, you are encouraged to act on that instinct. However, it is advisable not to continue a particular remedy once it is no longer needed, and to try a different one if progress is not being made.

The remedies are administered from a stoppered bottle and need to be diluted. Individuals sensitive to alcohol can apply the concentrate directly to temples, wrists, behind the ears, or underarms. When kept in a cool dark place, they should last indefinitely. However, a diluted remedy should not be kept longer than three weeks. Two drops of each diluted remedy should be taken four times a day, including first thing in the morning and last thing at night. If the rescue remedy is being used, four drops should be used instead. Most therapists recommend that they be taken in spring water, but the remedy can be taken directly from the bottle, if care is taken that the

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dropper does not touch the tongue, as this would introduce bacteria that would spoil the remedy.

It is not recommended that more than six or seven Bach remedies be used at any one time. Instead, it is preferable to divide a larger amount up into two lots to ensure the optimum effectiveness of the remedies. No combination, or amount of combinations of the remedies can cause any harm, rather they become less effective.

Unlike FES, the Bach Centre does not encourage research to "prove" that the remedies work, preferring that people find out for themselves. They strive to keep the use of the Bach remedies as simple as possible, and to this end they do not keep case records. Bach warned before he died that others would try to change his work and make it more complicated. He was determined to keep it simple so that anyone could use it, and that is why he limited the system to only 38 remedies. The Centre points out that many who have used Bach's research as a starting point have added other remedies to the list, even some that Bach himself rejected.

Side effects

Flower remedies or essences are generally regarded as being totally safe, and there are no known side effects apart from the rare appearance of a slight rash, which is not a reason to discontinue treatment, says the Bach Centre.

Research and general acceptance

Bach flower remedies and flower essences have not yet officially won the support of allopathic medicine, despite the fact that more and more medical doctors are referring patients for such treatments on the strength of personal conviction. However, it is difficult to discount the scores of testimonials. Some practitioners refer skeptics to the research that has been done regarding the "auras" of living things. Theoretically, the stronger the aura, the more alive an organism is. Flower essences have very strong auras.

Among mainstream medical practitioners, psychiatrists and family practitioners appear to be more willing to study flower essences than physicians in other specialties. One pilot study at Penn State Hershey Medical Center found that the **Bach flower essences** were effective in reducing the symptoms of **attention-deficit hyperactivity disorder** (ADHD) in children as measured by two standard assessment instruments for ADHD.

Another area of medicine in which acceptance of Bach flower essences is growing is small-animal veterinary practice. Two full-length books on the use of flower essences for behavioral problems in animals were published in 1999, and some schools of veterinary medicine now include flower essences as part of elective courses in holistic or complementary veterinary treatments.

Training and certification

The official Bach International Education Program training courses are all recognized by the Dr. Edward Bach Foundation, and taught by accredited Bach trainers. These qualifications are not recognized by the medical authorities.

Bach therapy may be self-administered, but for those who would prefer the advice of a practitioner, look for a registered Bach practitioner, or a homeopath or herbalist who also deals with the Bach flower remedies.

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ORGANIZATIONS

The Dr. Edward Bach Centre, Mount Vernon, Bakers Lane, Sotwell, Oxon, OX10 OPX, UK. centre@bachcentre.com. http://www.bachcentre.com.

The Flower Essence Society. P.O. Box 459, Nevada City, CA 95959. (800) 736-9222 (US & Canada). (530) 265-9163. Fax: (530) 265-0584. mail@flowersociety.org. http://www.flowersociety.org.

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Flu *see* **Influenza**

Fluid retention *see* **Edema**

Fo ti

Description

Fo ti is the American name for the herb *Polygonum multiflorum*. *Polygonum* is a member of the Polygonaceae family of plants and is a perennial flowering vine that reaches heights of 3–6 ft (0.97–1.8 m). It is native to southwestern China, Japan and Taiwan, but can be cultivated in many regions, including parts of North America.

In Chinese herbalism, fo ti (sometimes spelled fo-ti) is called *he shou wu* or *ho shou wu*. Other names are fleeceflower and Chinese cornbind. In Japan, the herb goes by the name *kashuu*. Fo ti is one of the most popular herbs in Oriental medicine. It is used as an overall health tonic, as a tincture to increase longevity, and as a remedy for various health conditions.

Chinese herbalists most frequently use the root of the plant for medicinal purposes, but occasionally draw on the stems for different applications. The root has a sweet and slightly bitter taste. Chinese herbalists claim it has slightly warming effects in the body, and works by increasing levels of blood and vital essence. These are two of three essential substances in the body, according to Chinese medicine. Chinese herbalists also maintain that fo ti strengthens the liver and kidneys. They use fo ti root in conjunction with other herbs in many medicinal tonics.

Research has shown that fo ti has antitumor and antibacterial properties. It also lowers blood pressure (hypotensive effects) and increases circulation (vasodilatory effects), providing an overall protective effect on the cardiovascular system. In addition, it has antioxidant and anti-free radical properties, which may associated with its connection to reported benefits to patients with **atherosclerosis**. A 2005 study in rabbits confirmed that it is "a powerful agent against atherosclerosis." In addition, a 2003 study showed that it contained significant estrogen activity, similar to that found in soy and **red clover**, and therefore may have applications as an alternative-medicine treatment for **menopause** symptoms. A 2005 study confirmed the high estrogen-content of fo ti.

Fo ti contains emodin and rhein, two laxative agents that have shown promising anti-cancer activity as well. Fo ti also contains **lecithin**, a B vitamin that aids in fat metabolism and lowers **cholesterol**. Researchers have isolated a flavonoid in fo ti called catachin, which is also found in **green tea**. Catachin inhibits tumor cells and has antioxidant effects, which may be the source of the anti-aging properties for which the herb is known in China. Researchers who conducted an animal study in 2003 reported improvements in both memory and learning among mice, and suggested that **antioxidants** in fo ti might be the reason for the improvements.

General use

Herbalists use fo ti for many conditions. They recommend it as an overall health strengthener, and to prevent premature **aging** and graying hair. Practitioners of Chinese medicine recommend it to increase sperm quality in men and fertility in women. They also advise its use for diseases associated with weakness in the liver and kidneys. These illnesses are characterized by blurred vision, **dizziness**, weakness in the knees and lower back, intermittent fevers, dull complexion, swollen lymph glands, and sores and **boils** on the skin. **Traditional Chinese medicine** has also used fo ti for non-acute **malaria**, for lowering cholesterol, and for nervous disorders. As fo ti has both laxative and tonic effects, herbalists suggest it for **constipation** in the elderly. They also use it to treat vaginal discharges, and fo ti's slightly sedative effect has led to its application as a treatment for **insomnia**.

Practitioners of Chinese medicine use the vine part of *Polygonum*, which is called *ye jiao teng*, to treat insomnia as well as irritability, and numb or **itching** sensations in the limbs.

Preparations

Fo ti is available for purchase as whole or sliced roots, in tablets, and as a tincture. Consumers can find it in health food stores, as well as in Chinese herb stores and markets. The reader should note that the Chinese do not recognize fo ti as the herb's proper name; in Chinese markets it is known as *he shou wu* or as *Polygonum*.

Consumers will typically find fo ti root available in slices. The older and larger the root, the higher quality and more expensive it is. In addition, herbalists

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KEY TERMS

Catachin—A flavonoid found in fo ti that has anti-oxidant and tumor-inhibiting qualities.

Flavonoids—Pigments found in plants that protect plants against environmental stress. In humans, they appear to have anti-aging effects.

Tonic—Any substance that strengthens and tones the entire system.

Sedative—A substance or medication that calms and lowers bodily activity.

consider dark roots a higher grade than roots that have white streaks in them. An herbalist may recommend eating the root or preparing it as a tea or tincture. The preparation for making tea involves boiling the root for 30 minutes or more to extract all the active ingredients. For one serving of the root or tea, herbalists recommend 5–15 g. The preparation for a tincture entails soaking chopped roots in alcohol for one month or longer, and individuals typically take 30 drops of the tincture daily. Tinctures are also available for purchase in varying concentrations, which causes associated variations in the daily dosages.

For sedative purposes, individuals generally take fo ti vine with the evening meal or before bedtime. Herbalists recommend taking fo ti continuously for up to one month, but then waiting one month before using it again.

Fo ti has uses in many herbal tonics. For longevity and overall health, Chinese herbalists recommend combining it with Asian ginseng. As a tonic for non-acute malaria or for recovery from a long illness, they suggest combining fo ti with Asian ginseng, **dong quai** and **tangerine peel**. For sore knees and lower back problems, herbalists combine fo ti with **cuscuta**, psorolea fruit, and **lycium fruit**. As part of a program of **cancer** treatment, they advise combining fo ti with other tonic and immune-enhancing herbs, including **Korean ginseng**, **astragalus**, milletia, and codonopsis. Experienced herbalists can assist consumers with special preparations and applications.

Precautions

Fo ti is generally a safe herb, but practitioners of Chinese medicine do not recommend it for patients with **diarrhea** or heavy phlegm in the respiratory tract.

Side effects

Reported side effects with fo ti are generally rare. They include diarrhea, abdominal **pain**, **nausea**, numbness in the extremities, flushing of the face, and skin **rashes**. Three case reports of acute **hepatitis** arising in patients following their use of an herbal product called Shou-wu-pian, which is derived from fo ti. In two of the three cases, medical professionals were not able to determine whether the fo ti or a product contaminant contributed to the hepatitis. In the third case, however, medical professionals found no contaminants and attributed the hepatitis to fo ti.

Interactions

Some herbalists advise patients to reduce their intake of onions, **garlic**, and chives while taking fo ti for extended periods.

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Folate *see* **Folic acid**

Folic acid

Description

Folic acid is a water-soluble vitamin belonging to the B-complex group of vitamins. These vitamins help the body break down complex carbohydrates into simple sugars that can be readily used for energy. Excess B vitamins are excreted from the body rather than stored for later use. This is why sufficient daily intake of folic acid is necessary.

Folic acid is also known as folate or folacin. It is one of the nutrients most often found to be deficient in the Western diet, and there is evidence that deficiency

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Recommended dietary allowance of folate (folic acid)

Age	mcg/day
Children 0-6 mos.	65 (AI)
Children 7-12 mos.	89
Children 1-3 yrs.	150
Children 4-8 yrs.	200
Children 9-13 yrs.	300
Children 14-18 yrs.	400
Adult ≥ 19 yrs.	400
Pregnant women	600
Breastfeeding women	500

Foods that contain folate	mcg
Cereal, 100% fortified, 3/4 cup	400
Beans, pinto, cooked, 1/2 cup	147
Turnip greens, cooked, 1/2 cup	135
Asparagus, cooked, 1/2 cup	132
Spinach, cooked, 1/2 cup	131
Beans, navy, cooked, 1/2 cup	127
Beans, great northern, cooked, 1/2 cup	90
Broccoli, steamed, 1/2 cup	85
Beets, boiled, 1/2 cup	68
Rice, long-grain white, enriched, cooked, 1/2 cup	65
Corn, yellow, cooked, 1/2 cup	37
Tomato juice, canned, 6 oz.	35
Bread, white, enriched, 1 slice	25
Bread, whole wheat, enriched, 1 slice	25
Raspberries, 1/2 cup	16

AI = Adequate Intake
mcg = microgram

(Illustration by GGS Information Services. Cengage Learning, Gale)

is a problem worldwide. Folic acid is found in leafy green vegetables, beans, peas and lentils, liver, beets, brussels sprouts, poultry, nutritional yeast, tuna, **wheat germ**, mushrooms, oranges, asparagus, broccoli, spinach, bananas, strawberries, and cantaloupes. In 1998, the U.S. Food and Drug Administration (FDA) required food manufacturers to add folic acid to enriched bread and grain products to boost intake and to help prevent neural tube defects (NTD) in the fetus during **pregnancy**.

General use

Folic acid works together with **vitamin B_{12}** and **vitamin C** to metabolize protein. It is important for the formation of red and white blood cells. Folic acid is necessary for the proper differentiation and growth of cells and for fetal development. It is also used to form the nucleic acid of DNA and RNA. It increases the appetite, stimulates the production of stomach acid for digestion, and aids in maintaining a healthy liver. A folic acid deficiency may lead to megaloblastic **anemia**, in which there is decreased production of red blood cells and the cells that are produced are abnormally large. This condition reduces the amounts of oxygen and nutrients that are able to reach the tissues. Symptoms may include **fatigue**, reduced secretion of digestive acids, confusion, and forgetfulness. During pregnancy, a folic acid deficiency may lead to preeclampsia, premature birth, and increased bleeding after birth.

People who are at high risk for strokes and **heart disease** may benefit from folic acid supplements. An elevated blood level of the amino acid homocysteine has been identified as a risk factor for some of these diseases. High levels of homocysteine have also been found to contribute to problems with **osteoporosis**. Folic acid, together with vitamins B_6 and B_{12}, aids in the breakdown of homocysteine, and may help reverse the problems associated with elevated levels of homocysteine.

Pregnant women have an increased need for folic acid, both for themselves and their unborn child. Folic acid is necessary for the proper growth and development of the fetus. Adequate intake of folic acid is vital for the prevention of several types of birth defects, particularly neural tube defects (NTDs). The neural tube of the embryo develops into the brain, spinal cord, spinal column, and the skull. If this tube forms incompletely during the first few months of pregnancy, a serious—and often fatal—defect such as spina bifida or anencephaly, may occur. Folic acid, taken from one year to one month before conception through the first four months of pregnancy, can reduce the risk of NTDs by 50 to 70%. It also helps prevent cleft lip and palate.

Research shows that folic acid can be used to successfully treat **cervical dysplasia**, a condition that is diagnosed by a Pap smear, and consists of abnormal cells in the cervix. This condition is considered to be a possible precursor to cervical **cancer**. Daily consumption of 1,000 micrograms (mcg) of folic acid for three or more months has resulted in improved cervical cells upon repeat Pap smears.

Studies suggest that long-term use of folic acid supplements may also help prevent lung and colon cancers. However, a study involving over 1,000 individuals, conducted at universities and research centers in the United States, Canada, and Norway, found that folic acid given in a dose of 1 mg per day does not lower the risk of colorectal adenoma. Scientists concluded that additional research in this area is needed.

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Alcohol is believed to interfere with the absorption of such important nutrients as folic acid. Researchers have found that alcoholics who have low folic acid levels face a greatly increased chance of developing colon cancer.

Supplements are taken to correct a folic acid deficiency. Since the functioning of the B vitamins is interrelated, it is generally recommended that the appropriate dose of B-complex vitamins be taken in place of single B vitamin supplements. The Recommended Dietary Allowance (RDA) for folate is 400 mcg per day for adults, 600 mcg per day for pregnant women, and 500 mcg daily for nursing women. Medicinal dosages of up to 1,000 to 2,000 mcg per day may be prescribed.

In January 2000, the Chile Ministry of Health required wheat flour (primarily used in bread) to be fortified with folic acid. A study performed at the University of Chile several years after the law was put into effect found that the folate status of Chilean women of childbearing age was improved.

Precautions

Folic acid is not stable. It is easily destroyed by exposure to light, air, water, and cooking. Therefore, the supplement should be stored inside a dark container in a cold, dry place, such as a refrigerator. Many medications interfere with the body's absorption and ability to use folic acid. These medications include sulfa drugs, sleeping pills, estrogen, anti-convulsants, birth control pills, antacids, quinine, and some antibiotics.

The anemia caused by folic acid deficiency is identical to that caused by lack of vitamin B_{12}. Using large amounts of folic acid (e.g., over 5,000 mcg per day) can mask a vitamin B_{12} deficiency, since the anemia will improve but the other effects of vitamin B_{12} deficiency will continue. This condition can lead to irreversible nerve damage. People with megaloblastic anemia should be treated under medical supervision, since regular testing may be required.

Side effects

Folic acid is generally considered safe at levels of 5,000 mcg or less. Side effects are uncommon. However, large doses may cause **nausea**, decreased appetite, bloating, **gas**, decreased ability to concentrate, and **insomnia**. Large doses may also decrease the effects of phenytoin (Dilantin), a seizure medication.

Interactions

As with all B-complex vitamins, it is best to take folic acid with the other B vitamins. Vitamin C is important to the absorption and functioning of folic acid in the body.

KEY TERMS

Homocysteine—An amino acid involved in the breakdown and absorption of protein in the body.

Preeclampsia—A serious disorder of late pregnancy, in which the blood pressure rises, there is a large amount of retained fluids, and the kidneys become less effective and excrete proteins directly into the urine.

Raynaud's disease—A symptom of various underlying conditions affecting blood circulation in the fingers and toes and causing them to be sensitive to cold.

Recommended Daily Allowance (RDA)—Guidelines for the amounts of vitamins and minerals necessary for proper health and nutrition. The RDA was established by the National Academy of Sciences in 1989.

Water-soluble vitamins—Vitamins that are not stored in the body and are easily excreted. These vitamins must be consumed regularly as foods or supplements to maintain health.

Resources

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ORGANIZATIONS

Centers for Disease Control and Prevention, 4770 Buford Highway NE, MSF-45, Atlanta, GA, 30341-3724, (888) 232-6789, http://www.cdc.gov/.

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Food poisoning

Definition

Food poisoning is a general term for health problems arising from eating food contaminated by viruses, chemicals, or bacterial toxins. Types of food

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Seafood with evidence of chemicals and toxins

Fish	Chemicals/Toxins
Bass	Dioxin, chlordane, DDT, PCBs, mercury
Catfish	Chlordane, DDT, dioxin, PCBs, etc.
Caviar	Chlordane, DDT, PCBs
Cod	DDT, PCBs
Maine Lobster	Dioxin, PCBs
Shark	DDT, PCBs, mercury
Striped Bass	PCBs, chlordane, DDT, mercury, etc.
Sturgeon	Chlordane, DDT, dieldrin, mercury, etc.
Swordfish	Mercury, DDT, PCBs
Tilefish	Mercury
Whitefish	Dioxin

(Illustration by Corey Light. Cengage Learning, Gale)

poisoning include bacterial food poisoning, shellfish poisoning, and mushroom poisoning. The medical term for food poisoning is **gastroenteritis**.

Description

The Centers for Disease Control and Prevention (CDC) estimates that there are up to 33 million cases of food poisoning in the United States each year. Many cases are mild, and they pass so rapidly that they are never diagnosed. Occasionally, a severe outbreak creates a newsworthy public health hazard, but these instances are rare. Anyone can get food poisoning, but the very young, the very old, and those with compromised immune systems have the most severe and life-threatening cases.

Causes and symptoms

General indications of food poisoning include **diarrhea**, stomach **pain** or cramps, gurgling sounds in the stomach, **fever**, **nausea**, and **vomiting**. Dehydration is a common complication, since fluids and electrolytes are lost through vomiting and diarrhea. Dehydration is more likely to happen in the very young, the elderly, and people who are taking diuretics.

Bacterial sources of food poisoning

Bacteria are major causes of food poisoning. Symptoms of bacterial food poisoning occur because foodborne bacteria release enterotoxins, or poisons, as a byproduct of their growth in the body. These toxins often diminish the absorptive ability of the intestines and cause the secretion of water and electrolytes that leads to dehydration. The severity of symptoms depends on the type of bacteria, the amount of bacteria and food consumed, and the individual's health and sensitivity to the bacteria's toxin.

SALMONELLA. Symptoms of poisoning begin 12–72 hours after eating food contaminated with *Salmonella*. Classic food poisoning symptoms, including fever, occur for about two to five days. *Salmonella* is usually transmitted through the consumption of food contaminated by human or other animal feces. This contamination is mostly due to lack of hand washing by food handlers.

***ESCHERICHIA COLI* (*E. COLI*).** Symptoms of food poisoning from *E. coli* O157:H7 and similar **strains** of *E. coli* are slower to appear than those caused by some of the other foodborne bacteria. One to three days after eating contaminated food, the victim begins to have severe abdominal cramps and watery diarrhea that usually becomes bloody. The diarrhea may consist mostly of blood and very little stool, so the condition is sometimes called hemorrhagic **colitis**. There is little or no fever, the bloody diarrhea lasts from one to eight days, and the condition usually resolves by itself. Food contamination from *E. coli* O157:H7 has mostly been found in raw or undercooked ground beef. Raw milk has also been a source of food poisoning by *E. coli*.

CAMPYLOBACTER JEJUNI. *C. jejuni* **infections** are most often caused by contaminated chicken, but unchlorinated water and raw milk may also be sources of infection. Classic symptoms of food poisoning, including fever and diarrhea, begin two to five days after consuming food or water contaminated with *C. jejuni*. The diarrhea may be watery and may contain blood. Symptoms last from seven to 10 days, and relapses occur in about one quarter of the people who are infected.

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Common pathogens causing food poisoning

Pathogen	Onset of Symptoms	Common Host(s)
Campylobacter	2 - 5 days	Poultry, unpasteurized milk, and contaminated water.
E. coli 0157:H7	1 - 8 days	Undercooked, contaminated ground beef. Can also be found in unpasteurized milk or apple cider, alfalfa sprouts, and contaminated water.
Listeria	9 - 48 hours	Found in a variety of raw foods, such as uncooked meats and vegetables, and in processed foods that become contaminated after processing, such as hot dogs, luncheon meats, and milks and cheeses.
Salmonella	1 - 3 days	Poultry, eggs, meat, milk, inadequately cooked foods.
Shigella	24 - 48 hours	This bacteria is transmitted through direct contact with an infected person or from food or water that become contaminated by an infected person.
Vibrio vulnificus	1 - 7 days	Contaminated seafood, raw or undercooked oysters, mussels, clams, and whole scallops, and contaminated water.

SOURCE: Food and Safety Inspection Service, U.S. Department of Agriculture

(Illustration by Corey Light. Cengage Learning, Gale)

***STAPHYLOCOCCUS AUREUS* (STAPH).** *Staph* is spread primarily by food handlers with *Staph* infections on their skin. However, contaminated equipment and food preparation surfaces may also be at fault. Almost any food can be contaminated, but salad dressings, milk products, cream pastries, and food kept at room temperature, rather than hot or cold, are likely candidates. Classic symptoms of food poisoning appear rapidly, usually two to eight hours after the contaminated food is eaten. Such symptoms usually last only three to six hours and rarely more than two days. Most cases are mild and the victim recovers without any assistance.

SHIGELLA. Symptoms of food poisoning by *Shigella* appear 36–72 hours after eating contaminated food. These symptoms are slightly different from those associated with most foodborne bacteria. In addition to the familiar symptoms of food poisoning, up to 40% of children with severe infections show neurological symptoms. These include seizures, confusion, **headache**, lethargy, and a stiff, sore neck. The disease runs its course in two to three days.

CLOSTRIDIUM BOTULINUM. *C. botulinum* (commonly known as botulism) is the deadliest of the bacterial foodborne illnesses. Sources for adult botulism are often improperly canned or preserved food. Symptoms of adult botulism appear about 18 to 36 hours after the contaminated food is eaten, although there are documented times of onset ranging from four hours to eight days. Unlike other foodborne illnesses, there is no vomiting and diarrhea associated with botulism. Initially, a person with botulism feels weakness, **dizziness**, and double vision. Symptoms progress to difficulty with speaking and swallowing. The toxins from *C. botulinum* are neurotoxins—they poison the nervous system, causing paralysis. If the disease proceeds unchecked, paralysis will move throughout the body. Eventually, without medical intervention, the respiratory muscles will become paralyzed and the victim will suffocate.

With infant botulism, the spores of *C. botulinum* lodge in the infant's intestinal tract. Honey, especially when consumed by infants younger than 12 months, is sometimes the source of these spores. Onset of the symptoms is gradual. The infant initially has **constipation**, followed by poor feeding, lethargy, weakness, drooling, and a distinctive wailing cry. Eventually the

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Types of food poisoning

Type	Cause
Traveler's diarrhea	Usually caused by otoxigenic *ESCHERICHIA COLI*, *(E.coli)* bacteria found in contaminated food and water.
Salmonella	Caused by bacteria in contaminated poultry, eggs, meat, and dairy products. Although it can be fatal, most cases are mild.
Botulism	Caused by anaerobic bacteria that is found in home canned products and honey.
Viral	Caused most often by contaminated raw seafood.
Chemical	Caused by pesticides.

(Illustration by Corey Light. Cengage Learning, Gale)

baby loses the ability to control its head muscles. Paralysis then progresses to the rest of the body.

Fish-associated food poisoning

Ciguatera fish poisoning is caused by toxins accumulated in the tissues of certain tropical fish, including groupers, barracudas, snappers, and mackerel. Signs of poisoning occur about six hours after eating the fish. Around the mouth, there may be numbness and tingling, which may spread to other places including the hands and feet. There is often muscle pain and weakness, headache, dizziness, joint pain, sensitivity to temperature, heart arrhythmias, dramatic changes in heart rate, and reduced blood pressure. Reef fish contaminated with ciguatoxin are being exported all over the world, occurrence of ciguatera is becoming more likely in colder climates.

Pufferfish, or *fugu*, is a traditional gourmet dish served mostly in Japan. The skin and other organs of the pufferfish contain a strong poison called tetradotoxin. The first stage of tetradotoxin poisoning is indicated by numbness of the lips and tongue, which may occur 20–180 minutes after eating the fish. This is followed by tingling and numbness of the face, hands, and feet. Classic symptoms of food poisoning are accompanied by other neurological symptoms such as light-headedness, headache, and unsteady gait. The second stage of tetradotoxin poisoning brings on a progressive paralysis. Breathing, talking, and other movement becomes difficult. Cyanosis (bluish or purplish skin discoloration), low blood pressure, and arrhythmias may occur. Convulsions and mental impairment may happen right before death, or the person may be completely lucid, though unmoving. Death usually occurs four to six hours after ingestion of the fish if there is no proper intervention; that time, however, has been known to be as little as 20 minutes.

Shellfish poisoning is caused by toxins made by certain algae eaten by shellfish. The toxins are then accumulated in the bodies of the shellfish. Cockles, mussels, clams, oysters, and scallops are most often affected. Sometimes the toxin-producing algae multiply to such an extent that they cause the waters they live in to take on the reddish color of their bodies. This phenomenon is known as a red tide. Warnings are often given against eating shellfish from such areas. Symptoms of food poisoning show up within a half an hour to two hours of eating the shellfish, depending on the amount and type eaten. There may be burning and tingling in the face and mouth, numbness, drowsiness, muscular pain, dizziness, diarrhea, stomachache, confusion, nausea, vomiting, odd temperature sensations, difficulty breathing, and possibly coma. The symptoms may last from a few hours to a few days.

KEY TERMS

Arrhythmia—A disrupted heartbeat pattern.

Disulfiram-like poison—Disulfiram is a chemical compound that causes a severe physiological reaction to alcohol. This poison behaves like disulfiram.

Electrolytes—Salts and minerals in the body that are important because they control body fluid balance and support all major body reactions.

Nasogastric intubation—Insertion of a tube through the nose and mouth for delivery of food and oxygen.

Neurotoxin—A poison that acts on the central nervous system.

Peristalsis—Waves of contractions, such as through the intestines, forcing the contents onward.

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Histamine poisoning can occur from eating fish whose body tissues have begun to produce high levels of histamine. Mackerel, tuna, and mahi mahi are most often the sources. After consumption of the fish, immediate facial flushing and **hives** may occur, as well as classic symptoms of food poisoning becoming evident a few minutes later. Symptoms usually last less than 24 hours.

Mushroom poisoning

Mushroom poisoning is classified by the effects of the poisons. Protoplasmic poisons result in cell destruction, often in the liver, which progresses to complete organ failure. Neurotoxins cause neurological symptoms such as sweating, convulsions, hallucinations, excitement, **depression**, coma, and colon spasms. Gastrointestinal (GI) irritants rapidly bring on the classic symptoms of food poisoning and then resolve just as quickly. Disulfiram-like poisons are generally nontoxic, except when alcohol is consumed within 72 hours of eating them. In these cases, the poisons cause headache, nausea, vomiting, flushing, and cardiac disturbances for two to three hours.

Other possible sources

Other possible sources of food poisoning include ingestion of green or sprouting raw potatoes, ingestion of fava beans by susceptible persons, and ergot poisoning from ingestion of contaminated grain. Chemical contaminant food poisoning may result from the ingestion of unwashed produce sprayed with arsenic, lead, or insecticides. Food served or stored in lead-glazed pottery cadmium-lined containers may also lead to food poisoning.

Diagnosis

An important aspect of diagnosing food poisoning is the clinical interview. A history of the illness should be thoroughly traced to include ingestion of food, recent travel, and contact with those showing similar symptoms of illness. Because it may take 30 minutes to three days for symptoms to develop, it is not necessarily the most recent food eaten that is the cause of the symptoms. Diagnosis is confirmed with a stool culture. Other laboratory tests may be used to examine vomitus, blood, or the contaminated food. A blood chemistry panel may be performed to determine the extent of any tissue damage or electrolyte imbalances. Many cases of food poisoning go undiagnosed, and treatment focuses on the short-lived GI symptoms.

Botulism is usually diagnosed from its distinctive neurological symptoms, since rapid treatment is essential to save the patient's life. Electromyography, a test analyzing the electrical activity of muscles, may later be done to further confirm diagnosis. The test shows abnormal muscle activity in most cases of botulism.

Treatment

People with food poisoning should reduce all sugar and normal food for eight to 24 hours, and increase fluids to avoid dehydration. Charcoal tablets, *Lactobacillus acidophilus*, *Lactobacillus bulgaricus*, and citrus seed extract are all recommended. For mild cases of food poisoning, the homeopathic remedies *Arsenicum album, Veratrum album, Podophyllum,* or ***Nux vomica*** are recommended. The remedy should be given in 12C potency every three to four hours until symptoms subside. If a ready-made electrolyte replacement is not available, a homemade one can be made by dissolving exactly 1 tsp (5 ml) of salt and 4 tsp (20 ml) of sugar in 1 qt (1 l) of water.

Cinnamon (*Cinnamonum zeylanicum*), cloves (*Syzigium aromaticum*), oregano (*Origanum vulgare*), and **sage** (*Salvia officinalis*) are food herbs that are also strong inhibitors of bacteria. Liberal amounts can be added to foods, especially when traveling. **Grapefruit seed extract** has a natural antibiotic effect and may be of help. Large amounts of **garlic**, in food and in supplement form, are also recommended for the same reason.

Allopathic treatment

In serious cases of food poisoning, medications may be given to stop abdominal cramping and vomiting. Medications are not usually given for the diarrhea, since stopping it might keep toxins in the body longer and prolong the illness. Severe bacterial food poisonings are sometimes treated with antibiotics, but their use is controversial. Washing out the stomach contents to remove the toxic substances may be required. This procedure is called gastric lavage, familiarly known as having the stomach pumped. Neurotoxins often interfere with the breathing process. If the ability to breathe is affected, patients may have to be put on a mechanical ventilator to assist their breathing and are fed intravenously until the paralysis passes.

People who show any signs of botulism poisoning must receive immediate emergency medical care. Both infants and adults suffering from food poisoning by *C. botulinum* require hospitalization, often in the intensive care unit. A botulism antitoxin is given to adults, if it can be administered within 72 hours after

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symptoms are first observed. If given later, it provides no benefit. Nasogastric intubation is recommended for the feeding of infants with active botulism. As well as supplying **nutrition**, it will stimulate peristalsis, helping in the elimination of *C. botulinum*.

Treatment of food poisoning that is usually not an emergency situation may include drugs such as **ipecac** syrup to induce vomiting or laxatives to empty the intestines. Intravenous fluids containing salts and dextrose may be given to correct dehydration and electrolyte imbalances. Pain medications are given for severe stomach pain. Atropine is given for muscarine-type mushroom poisoning. If illness comes on after eating unidentified mushrooms, vomiting should be induced immediately, and the vomitus saved for laboratory testing. Intravenous mannitol is sometimes used to treat severe ciguatera poisoning. Antihistamines may be effective in reducing the symptoms of histamine fish poisoning. In 2001, Japanese scientists made a synthetic version of ciguatoxin, an important step in developing an antibody to help diagnose ciguatera.

In mild cases of food poisoning, dietary modifications are often the only treatment necessary. During periods of active vomiting and diarrhea, people with food poisoning should avoid solid food for eight to 24 hours, and should increase fluids. Clear liquids should be consumed in small quantities. Once active symptoms stop, a diet of bland, easily digested foods such as broth, eggs, rice and other cooked grains, and toast is recommended for two to three days. Milk products, spicy food, alcohol, sweets, raw vegetables, and fresh fruit should be avoided.

Expected results

Many cases of food poisoning clear up on their own within a week without medical assistance. There are usually few complications once possible dehydration has been addressed. **Fatigue** may continue for a few days after active symptoms stop, however. In the more severe types of poisoning, especially those involving neurotoxins, the respiratory muscles may become paralyzed. In such cases, death will result from asphyxiation unless there is medical intervention. Deaths due to food poisoning are rare and tend to occur in the very young, the very old, and in people whose immune systems are already weakened.

C. botulinum, is likely to cause serious illness or fatalities, even when ingested in very small quantities. Children affected by food poisoning from *E. coli* often need to be hospitalized. In some cases, *E. coli* toxins may be absorbed into the bloodstream where they destroy red blood cells and platelets, which are important in blood clotting. About 5% of patients, regardless of age, develop hemolytic uremia syndrome, which results in kidney failure.

Prevention

Eighty-four percent of adults surveyed in 2001 were unaware that feces on beef and poultry was the main carrier of *Salmonella, Campylobacter*, and *E. coli*. Other than informing the public, food poisoning prevention efforts include:

- hot foods should be kept hot, and cold foods should be kept cold
- meat should be cooked to the recommended internal temperature; eggs should be cooked until no longer runny
- leftovers should be refrigerated promptly and food should never be left to stand at room temperature
- contact of utensils and surfaces with the juices of raw meats should be avoided
- fruits and vegetables should be washed before using
- unpasteurized dairy products and fruit juices should be avoided
- bulging or leaking canned foods or any food that smells spoiled should be discarded
- hands should be washed with soap before food preparation and after using the bathroom
- food preparation surfaces should be sanitized regularly
- infants under 12 months should not be fed honey, which may contain spores of *C. botulinum*
- proper canning and adequate heating of home-canned food before serving are essential (boiling for three minutes is recommended)

Taking *Lactobacillus acidophilus* or *L. bulgaricus* may help prevent food poisoning, especially when traveling. Populating the intestines with these bacteria will make it less likely that harmful bacteria are able to gain a foothold.

Resources

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Patience Paradox
Teresa Odle

Foxglove *see* **Digitalis**

Fractures

Definition

A fracture is a crack or break in a bone. It results from the application of excessive force through injuries, such as a fall or a hard blow.

Description

Up to the age of 50, more men suffer from fractures than women because of occupational hazards. However, after the age of 50, more women suffer fractures than men because of the osteoperosis. Simple, or closed, fractures are not obvious on the surface because the skin remains intact. Compound, or open, fractures break through the skin, exposing bone. They are generally more serious than closed fractures. When bones are broken, there may be an accompanying soft tissue injury or an infection either in the surrounding tissue or the bone itself. If an artery is damaged, there can be a significant loss of blood. Single and multiple fractures refer to the number of breaks in the same bone. Fractures are termed complete if the break is completely through the bone, and described as incomplete, or greenstick, if the fracture occurs partly across a bone shaft. This latter type of fracture is often the result of bending or crushing on the bone. A **stress** fracture is usually a small break in the bone due to repeated or prolonged force.

Causes and symptoms

Fractures usually result from an injury to a bone that causes the bone tissue or cartilage to be disrupted or broken. Bones weakened by disease or misuse are more likely to break. In some women who have gone through **menopause**, the bones fracture easily due to osteoperosis. This is because the body produces less estrogen at that time of life, and estrogen is a major regulator of bone density through its effects on **calcium** in the body. Moderate **exercise** and weight training is helpful in building and maintaining strong bones; so, the bones of an inactive person may also tend to fracture easier than those who are moderately active. However, individuals with a very high activity level have a greater risk of fractures. This group includes children and athletes participating in contact sports. Because bones start to thin out with the **aging** process, the elderly are also at a high risk of sustaining a fracture. Diseases that may lead to an increased risk of fractures include Paget's disease, rickets, osteogenesis imperfecta, **osteoporosis**, tumors, deficiencies of vitamins A or D, and **stroke** induced paralysis.

Fractures usually begin with intense **pain** and swelling at the site of injury. Obvious deformities, such as a crooked or otherwise misshapen limb, point to a possible fracture. Pain that prevents the use of a limb may also indicate a break. In severe fractures, there may be a loss of pulses below the fracture site and a resultant numbness, tingling, or paralysis in the feet, hands, fingers, or toes below the site. An open fracture is often accompanied by bleeding or bruising. If a leg is fractured, there will usually be difficulty bearing weight on it. If there is **dizziness**, sweating, disorientation, or thirst, the onset of shock may be indicated.

Diagnosis

Diagnosis begins immediately with the individual's own observation of symptoms. A thorough medical history and physical exam completed by a physician often provides enough information to determine if further testing is necessary. An x ray of the injured area is most commonly used to determine the presence of a bone fracture. However, it is important to note that not all fractures are apparent on an initial x ray. Rib fractures are often difficult to diagnose and may require several views at different angles. If the fracture is open and occurs in conjunction with soft tissue injury, further laboratory studies may have to be done.

In the event of stress fractures, a tuning fork can provide a simple, inexpensive test. The tuning fork is a metal instrument with a stem and two prongs that vibrate when struck. If a patient has increased pain when the tuning fork is placed on the bone, such as the lower leg bone or shinbone, the likelihood of a stress fracture is high. Bone scans also are helpful in detecting stress fractures or other difficult-to-detect fractures.

Treatment

Prevention is the most effective way to avoid fractures. Wearing protective gear, such as a helmet, or

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KEY TERMS

Bone scan—A diagnostic procedure in which radioactive tracer is injected and images are taken of specific areas or the entire skeleton.

Osteoporosis—Literally meaning "porous bones," this condition occurs when bones lose an excessive amount of their protein and mineral content, particularly calcium. Over time, bone mass and strength are reduced leading to the increased risk of fractures.

Paget's disease—A common disease of the bone of unknown cause usually affecting middle-aged and elderly people, characterized by excessive bone destruction and unorganized bone repair.

Rickets—A condition caused by the deficiency of vitamin D, calcium, and usually phosphorus, seen primarily in infancy and childhood, and characterized by abnormal bone formation.

using protective equipment, such as safety gear, while playing sports may greatly reduce the risk of a fracture.

A daily multivitamin and mineral supplement (for instance, containing calcium, **magnesium**, **boron**, strontium) is recommended to help build and maintain a healthy, resilient skeleton. These, together with an adequate protein intake, will also help rebuild the bone and surrounding tissue. Some physical therapists use electro-stimulation over a fractured site to promote and expedite healing. Chinese traditional medicine seeks to reconnect the qi through the meridian lines along the line of a fracture. **Homeopathy** can enhance the body's healing process. A particularly useful homeopathic remedy for soft tissue is *Arnica* 12c, taken every 10 minutes for the first two hours after injury, and then once every eight hours for two to three days. *Symphytum officinalis* is also a good remedy to help heal the fractured bone.

Calming herbs are often useful for relief of pain and tension. Cups of **chamomile** (*Matricaria recutitca*), **catnip** (*Nepeta cataria*), or **lemon balm** (*Melissa officinalis*) tea can be given freely for a calming effect. Fifteen drops of **skullcap** (*Scutellaria lateriflora*), **St. John's wort** (*Hypericum perforatum*), or **valerian** (*Valeriana officinalis*) tincture can be given every half hour as needed. A tea to encourage the bone tissue to knit and heal can be made by mixing together one ounce each of **comfrey** leaves (*Symphytum officinale*), nettles (*Urtica dioica*), and oatstraw (*Avena sativa*), plus half an ounce each of **horsetail**, skullcap, and **marsh mallow** root (*Althaea officinalis*). One quarter ounce each of **fennel** seeds (*Foeniculum officinalis*) and **peppermint** leaves (*Mentha piperita*) should also be added. A strong tea should be made of one ounce of the mixture in one quart of boiling water, which should steep for at least a half hour. The dosage is two cups taken daily. Frequent soaks or compresses with comfrey root in the water is recommended if there is no broken skin. *Arnica montana*, *Calendula officinalis*, St. John's wort, or comfrey salves or ointments can improve healing when applied externally, as well.

After initial treatments, the application of contrast **hydrotherapy** to a hand or foot below the area of the fracture can be used to assist healing by enhancing circulation. Contrast hydrotherapy uses an alternating series of hot and cold water applications. Either compresses or basins of water may be used. First, hot compress is applied for three minutes. It is followed by cold water for 30 seconds. These applications are repeated three times each, ending with the cold water.

Allopathic treatment

Broken bones need to be treated as soon as possible by a physician. Temporary measures include applying ice packs to injured areas, and the use of aspirin or nonsteroidal anti-inflammatories (NSAIDS) to reduce pain and swelling. Initial first aid for a fracture may include splinting, control of blood loss, and monitoring of vital signs, such as breathing and circulation. Medical treatment will depend on the location of the fracture, its type and severity, and the individual's age and general health status. If an open fracture is accompanied by serious soft tissue injury, it may be necessary to control bleeding and the shock that can accompany it.

Immobilization of the fracture site can be done internally or externally. The primary goal of immobilization is to maintain the realignment of the bone long enough for healing to start and progress. Immobilization by external fixation uses splints, casts, or braces; this may be the primary and only procedure for fracture treatment. Splinting to immobilize a fracture can be done with or without traction. In emergency situations, splinting is a useful form of fracture management, if medical care is not immediately available. It should be done without causing additional pain and without moving the bone segments. In a clinical environment, plaster of Paris casts are used for immobilization. Braces are useful as they often allow movement above and below the fracture site.

Open reduction is surgery that is usually performed by an orthopedist. It allows the surgeon to

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examine and correct soft tissue damage while the bones are being repositioned into their normal alignment. Internal fixation devices, such as metal screws, plates, and pins, hold the bones in place as they heal. Fragments are often held together with metal rods. The physician may or may not elect to remove these devices when healing is complete. Open reduction is most often used for open, severe, or comminuted fractures. Fractures with little or no displacement of the bones do not usually require such surgery.

Closed reduction refers to realigning the bones without using surgery. It is accomplished by manually adjusting the bones or using traction, and often requires the use of an anesthetic. Traction is a form of closed reduction that works by applying a steady force to the bones, pulling on them with weights until the proper alignment is achieved. The traction device can also be used to immobilize the affected area while the bone heals. Since traction restricts movement, this treatment means that the patient will be confined to bed rest for an extended period of time.

In external fixation, pins or screws are attached to the bone directly above and below the site of the fracture. They are then connected to a device of metal bars fixed over the skin. These act as a frame, keeping the bones aligned so they can heal properly. With any type of treatment for a fracture, muscle and joint strength and flexibility should be maintained through proper exercises done as the bone tissue heals.

Healing time for fractures varies from person to person, with the elderly generally needing more time to heal completely. Recovery is complete when there is no bone motion at the fracture site, and x rays indicate complete healing.

Expected results

Fractures can normally be cured with proper first aid and after care. Proper realignment of the bones is much more difficult if the break has occurred more than six hours in the past. If broken bones are not properly treated, deformities may occur as the bones heal, and strength and flexibility may be affected.

Prevention

Adequate calcium intake, as well as intakes of other minerals like magnesium, boron, strontium, and others, is necessary for strong bones and can help decrease the risk of fractures. Foods rich in calcium should be eaten. These include fish, dairy products, sardines, broccoli, enriched soymilk, seaweed, tahini, and other sesame seed foods, nuts, molasses, and dark leafy green vegetables. Calcium supplements may be also be useful; however, those with bone meal or oyster shell have been found to often contain toxic heavy metals. Adequate stores of **vitamin D** are needed to help use calcium, therefore, some time should be spent in the sun, as this will activate vitamin D and help decrease fractures. Safety measures to avoid accidents that may bring on fractures include wearing seat belts and protective sports gear, when appropriate. Estrogen replacement combined with exercise and weight training for women past the age of 50 has been shown to help prevent osteoporosis and the fractures that may result from this condition.

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Patience Paradox

French green clay

Description

French green clay is a substance that is used for external cosmetic treatments as well as some internal applications by practitioners of alternative medicine. It was used in ancient Egypt, Greece, and Rome to treat a variety of skin problems and digestive disorders.

From the standpoint of mineralogy, French green clay belongs to a subcategory of clay minerals known as illite clays, the other two major groups being kaolinite and smectite clays. Clay minerals in general are important because they make up about 40% of such common rocks as shale, and they are the main components of soil. Illite clays are usually formed by weathering or by changes produced in aluminum-rich minerals by heat and acidic ground water. They often occur intermixed with kaolinite clays—which are typically used in the ceramics industry. Illite clays have been used successfully by environmental managers to

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Mixing French green clay with water. The clay's green color comes from a combination of iron oxides and decomposed plant matter, mostly kelp seaweed and other algae. *(BSIP/Phototake, Reproduced by permission.)*

remove such heavy metals as lead, cadmium, and **chromium** from industrial wastewater.

French green clay takes its name from the fact that rock quarries located in southern France enjoyed a virtual monopoly on its production until similar deposits of illite clays were identified in China, Montana, and Wyoming. The clay's green color comes from a combination of **iron** oxides and decomposed plant matter, mostly **kelp** seaweed and other algae. Grey-green clays are considered less valuable than those with a brighter color. The other components of French green clay include a mineral known as montmorillonite, as well as **dolomite**, **magnesium**, **calcium**, **potassium**, **manganese**, **phosphorus**, **zinc**, aluminum, silicon, **copper**, **selenium**, and cobalt.

French green clay is prepared for the commercial market by a process of sun-drying and crushing. After the clay has been mined, it is spread in the sun to remove excess water. It is then ground by large hydraulic crushers and micronized, or finely pulverized. The last stage in the process is a final period of sun-drying to remove the last traces of water. French green clay is available in a dry powdered form for a variety of uses as well as in premixed soaps, scrubs, facial powders, and masks for cosmetic purposes. Prices for an eight-ounce jar of powdered clay range between $4.50 and $11.00 in health food stores. Soaps made with French green clay are priced at about $4.50 a bar.

General use

External

French green clay is most commonly used in the United States and Canada for cosmetic purposes, as distinct from medicinal treatments. It is regarded as a useful treatment for stimulating the skin and removing impurities from the epidermis (outermost layer of skin cells). The clay works by adsorbing impurities from the skin cells, by causing dead cells to slough off, and by stimulating the flow of blood to the epidermis. As the clay dries on the skin, it causes the pores to tighten and the skin to feel firm.

Other external uses for French green clay include poultices to treat arthritis, sore muscles, and **sprains**;

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KEY TERMS

Adsorption—A process in which an extremely thin layer of one substance (liquid, gas, or solid) forms on the surface of another substance. French green clay works as a cosmetic treatment by adsorbing toxic substances from the skin.

Epidermis—The outermost layer of skin cells.

Illite—A family of hydrous potassium aluminosilicate clays, characterized by a three-layer structure and a gray, light green, or yellow-brown color. The name is derived from Illinois, where these clays were first classified in 1937. French green clay belongs to this group of clays.

Poultice—A soft cloth filled with a warm moist mass of grains, herbs, or other medications applied to sores or injured parts of the body.

ready-to-use pastes for application to **cuts**, **bruises**, insect **bites**, **stings**, and minor **burns**; and mineral baths for **stress** relief. Some practitioners maintain that the plant matter in French green clay has anti-inflammatory as well as antiseptic or bactericidal properties. It is interesting that a group of Italian researchers reported in 2002 that French green clay powder is as effective as salicylic sugar powder in preventing infection of the umbilical stump in newborns. The clay powder was found to be superior to powders containing **colloidal silver**, antibiotics, or fuchsine.

Internal

Internal uses of French green clay are more popular in Europe than in North America, although some American alternative healers recommend drinking or gargling with solutions of French green clay to cleanse the digestive tract, treat **nausea** or other gastric disorders, ease menstrual cramps, or relieve sore throats. It is claimed that French green clay absorbs toxins from the stomach and intestines as well as neutralizing radioactivity in the body. A French naturopath states that the copper in the clay fights **infections**, the cobalt helps to prevent **anemia**, the selenium aids liver function and slows down the **aging** process, and the other minerals restore the body's overall equilibrium.

Preparations

External

Facial masks: Commercial prepackaged clay masks are generally spread on the face directly from the jar or tube, care being taken to avoid the eye area. After the clay dries—usually about 10–15 minutes—the mask is washed off with warm running water. To make a facial mask from powdered clay, combine 1/2 to 1 tbsp of the powder with 1–2 tbsp of water and apply to the skin; rinse with warm water after 10 minutes. Some users add a few drops of **aloe** vera gel to the clay mixture. A recipe for a facial mask for oily skin consists of mixing 1 tbsp of powdered clay with five drops of **jojoba oil**.

A recipe for a "gourmet spa facial mask" calls for mixing 1/4-cup of French green clay powder with 1/4-cup water. After the clay and water have been well blended, 2 tbsp of honey and 1/4-cup of mashed banana or avocado are added to the mixture. The mask is applied to the face, allowed to remain for 10 minutes, and rinsed off with warm water.

Deodorizing foot treatment: A half-cup of powdered French green clay is mixed with 1/2-cup of water and 2–3 drops of tea tree essential oil. The mixture is applied to the feet, covered loosely with plastic wrap, and rinsed off after 15 minutes with cool water. The feet may then be rubbed with a moisturizing cream.

Poultice: One poultice recipe calls for mixing several tablespoons of powdered clay with enough water to form a thick paste and allowing it to stand in a glass bowl for two hours. The paste is then applied in a layer about 1/4-in thick to a piece of gauze. The poultice is applied to the injured area with the gauze uppermost and held in place with adhesive tape. It can be left in place as long as two hours, but the clay should not be allowed to dry. Up to six drops of essential oil of **lavender**, Roman **chamomile**, **ginger**, or **rosemary** may be added if desired. Poultices should not be reused but discarded after use.

Mineral bath: A half-cup of powdered French green clay can be added to a tub of warm water to soothe sunburned or irritated skin, or relieve arthritis or muscle pains.

Internal

To cleanse the digestive system, mix 1 tsp of powdered clay in an 8–10-oz glass of mineral water and allow to stand overnight. The mixture may be taken the next morning either as the clear liquid that has risen to the top or after stirring to recombine the clay and water. It is to be taken every morning for 21 days. The treatment should not be repeated until a week after the last dose. The clay mixture can also be used to relieve menstrual cramps; it is taken each morning during the first three weeks of the woman's cycle. After the flow begins, a warm clay poultice can be applied to the abdomen in the morning and evening.

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A recipe for a **sore throat** gargle consists of 1–2 tsp of clay added to a glass of salt water with 1–2 drops of essential oil of rosemary or lavender. The gargle can be used several times a day until the symptoms are relieved.

A European regimen for treating **hemorrhoids** consists of drinking three glasses of powdered clay in water each day for three weeks, alternating with three weeks without the mixture over a total period of three months. The clay-and-mineral water mixture can also be combined with tinctures of Indian vine and **witch hazel**. In addition, poultices made with green clay can be applied to the affected areas in the morning, followed by a cold bath. The poultices may also be applied at night.

Precautions

Alternative healers state that French green clay should never be mixed with metal spoons or stored in metal containers; the only materials that should be used in preparation or storage are wooden spoons or glass stirrers, and either glass or ceramic containers. It is thought that the clay loses its beneficial qualities through contact with metal. This belief has some scientific basis in the fact that illite clays have been found to be highly effective in removing heavy metals in the wastewater produced by various industries.

External

As a rule, French green clay masks should be used only once a week because the clay tends to dry the skin. In addition, cosmetics containing French green clay are not recommended for naturally dry or sensitive skins, as the mineral content of the clay is an irritant. Soaps made with French green clay should be used only for oily skin.

Internal

French green clay may cause **constipation** when taken internally. Some practitioners recommend drinking only the water without the clay at the bottom of the glass in the morning for this reason.

Side effects

French green clay may cause skin **rashes** or patches of dry flaky skin when used on the face. It may cause constipation when taken internally. No side effects from mineral baths or poultices have been reported.

A group of American toxicologists reported in 2003 that illite clays as a group appear to be safe for short-term internal use in humans as well as external cosmetic applications. There have, however, been isolated reports of lung damage caused in workers exposed to particles of montmorillonite—one of the major components of French green clay—in spray paints and primers.

Interactions

No interactions with prescription drugs or herbal remedies have been reported for French green clay as of 2008. However, because of the adsorptive qualities of French green clay, it may interfere with absorption of medications.

Resources

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ORGANIZATIONS

Cosmetic Ingredient Review (CIR). 1101 17th Street NW, Suite 310, Washington, DC 20036. (202) 331-0651. Fax: (202) 331-0088. http://www.cir-safety.org.

Society of Cosmetic Chemists (SCC). 120 Wall Street, Suite 2400, New York, NY 10005-4088. (212) 668-1500. Fax: (202) 668-1504. http://www.scconline.org.

U. S. Food and Drug Administration (FDA). 5600 Fishers Lane, Rockville, MD 20857-0001. (888) INFO-FDA. http://www.fda.gov.

Rebecca Frey, Ph.D.

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Fritillaria

Description

Fritillaria is the processed bulb of *Fritillaria cirrhosa*, a flowering plant in the Liliaceae family. A perennial temperate herb, it grows in mountain slope and sub-alpine meadows, usually on open, stony, and moist hillsides. In the West, fritillaria is most commonly regarded as an ornamental garden plant. By contrast, it is traditionally valued as an herbal remedy in Nepal and China, where it grows in the Gansu, Qinghai, Sichuan, Xizang, and Yunnan provinces. Two related species, *F. thunbergii* and *F. hupehensis*, are also used medicinally, and in some regions, *F. unibracteata, F. przewalski,* and *F. delavayi* are used as botanical substitutes.

In **traditional Chinese medicine**, fritillaria is called *chuan bei mu,* which translates as "Shell mother from Sichuan." English common names include fritillary, tendrilled fritillary bulb, and Sichuan fritillary bulb. Its pharmaceutical name, used to distinguish it as a medicine, is Bulbus Fritillariae Cirrhosae, and it is one of more than 500 plants recognized as official drugs in traditional Chinese medicine.

General use

Practitioners of Chinese medicine believe that fritillaria affects the heart and lung meridians, or energy pathways in the body, and use it primarily to treat various lung conditions, including **asthma**, **bronchitis**, **tuberculosis**, and coughs of any type. In the traditional Chinese medical system, the white color of fritillaria is thought to indicate its usefulness for treating ailments of the lungs, which are associated with the color white. In the categories of Chinese herbal medicine, fritillaria is classified as being bitter, sweet, and mildly cold.

Fritillaria is used for many types of **cough**, particularly chronic cough, cough associated with difficult expectoration, and cough with blood-streaked sputum. Chinese practitioners prescribe it to moisten dry mucous membranes, resolve phlegm, and control coughing. It is thought to be most effective for coughs accompanied by reduced appetite and a stifling sensation in the chest and upper abdomen, symptoms that indicate suppressed qi, or vital energy.

Fritillaria's secondary use is as a lymphatic decongestant to reduce swellings, nodules, fibrocystic breasts, goiter, and swollen lymph glands. In China, it also is used for thyroid and **lung cancer**.

Research on *F. cirrhosa* and its botanical relatives has generally been conducted in China and has focused on pharmacological investigation. These studies show that *F. cirrhosa* and other related species contain compounds that have antitussive and expectorant activity because they inhibit contraction of bronchial smooth muscle and decrease secretion of mucus. Compounds responsible for this activity, as defined in Western chemistry, include several bioactive isosteroidal alkaloids (verticine, verticinone, isoverticine, imperialine, hupehenine, ebeiedine, ebeienine, and ebeiedinone) and two nucleosides (thymidine and adenosine). The discovery of a new diterpenoid ester in fritillaria was reported in 2002.

Animal research has also demonstrated central-nervous-system inhibition, including a prolonged decrease in blood pressure, stimulation of the heart muscle, and dysfunction of breathing. In addition, a study conducted by scientists in Korea in 2007 tested *F. cirrhosa* in a model of asthma in mice. They found that it inhibits airway inflammation by several methods including the suppression of certain types of proteins/peptides called Th2 cytokines, an antibody known as immunoglobulin E (IgE), and the production of histamine.

Preparations

Fritillaria is not generally available in American health food stores, but processed forms are available at Chinese pharmacies and Asian groceries. Consumers can purchase fritillaria-containing Chinese patent medicines in pill, capsule, powder, and syrup form over the Internet. As medicine, fritillaria comes in four categories, based on shape and the location in which it was grown: *song-pei, lu-pei, ching-pei,* and *ming-pei.* Because the raw bulb is toxic, all medicinal forms are processed. Good-quality processed powder is white and has a fine consistency. Small, white, lobed bulbs that have been boiled or steamed and dried also may be available.

The standard dose ranges from 3–12 g daily as a decoction (strong tea) or 1–1.5 g as powder. Pills in equivalent doses are also available, and the herb also may be applied externally as either a powder or cream.

Practitioners of Chinese medicine commonly combine fritillaria in patent formulas along with other Chinese herbs such as ma huang (*Ephedra sinica*) and ballanflower (*Platycodon grandiflorum*). It is also found in many cough medicine formulas in liquid form. The following are the major herbs with which

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KEY TERMS

Alkaloids—A diverse group of nitrogen-containing substances that typically taste bitter. Most alkaloids are toxic, although a minority of them are medicinally beneficial.

Cold—In Chinese pathology, the term defines a condition that has insufficient warmth, either objective (hypothermia) or subjective (feeling cold).

Decoction—A strong tea brewed for twenty to thirty minutes; generally used for woodier herbs.

Meridians—Energetic pathways inside the body through which qi flows.

Nucleosides—Any of various compounds consisting of a sugar and a purine or pyrimidine base, especially a compound obtained by hydrolysis of a nucleic acid.

Patent formulas—Chinese herbal formulas that were patented centuries ago and are believed to be proven over centuries of use and study.

Qi—The Chinese medical term for physiological energy or more generally for the life force.

Sputum—Matter coughed up from the respiratory tract, including saliva, mucus, or phlegm.

it is combined and the symptoms for which the combinations are prescribed:

- bitter apricot kernel (*Prunus armeniaca; xing ren*) for cough and wheezing with copious sputum
- loquat leaf (*Eriobotrya japonica; pi pa ye*), dwarf lilyturf root (*Ophiopogon japonicus; mai men dong*) and Solomon's seal root (*Polygonatum odoratum; yu zhu*) for chronic cough with fatigue, irritability, and lack of appetite
- thin-leaf milkwort root (*Polygala tenuifolia; yuan zhi*), hoelen fungus (*Poria cocos; fu ling*), and snake-gourd fruit (*Trichosanthes* spp.; *gua lou*) for painful obstruction of the chest with palpitations and insomnia
- Zhejiang fritillary bulb (*F. thunbergii; zhe bei mu*) for scrofula (a form of tuberculosis affecting the lymph nodes) and abscess

Precautions

The unprocessed bulb of fritillaria is toxic, and commercial sources are generally processed. Pregnant women should not use fritillaria unless under the advice of a practitioner trained in the use of the herb. Fritillaria should never be given to children. It is also contraindicated for patients with digestive weakness.

Australian authorities recommend that products containing *F. cirrhosa* include the following label caution: "Warning: Do not exceed the stated dose." Canadian regulations list *F. thunbergii*, a close relative of *F. cirrhosa*, as unacceptable for inclusion in non-medicinal oral products.

A general precaution to observe when using any Chinese patent medicine is to purchase only well-known brands recommended by a practitioner of traditional Chinese medicine. Cases have been reported of incorrect labeling, contamination with heavy metals, and substitution of Western pharmaceuticals for the Chinese ingredients. Any of these occurrences can present a serious health hazard.

Side effects

Side effects from fritillaria extracts used in Chinese patent medicines are rare, but this is partly because fritillaria is usually a minor ingredient in these formulae, often only 10% of the formula by weight. Even in medicines that list fritillaria as a major ingredient, it is never more than 28% of the compound. Tests of fritillaria extract in human subjects reported no side effects when the extract was taken by mouth. On the other hand, high-dosage intravenous injections of alkaloids isolated from fritillaria produced pupil dilation, **tremor**, slowing of the heart rate, and lowered blood pressure in human subjects.

Interactions

No interactions with standard pharmaceuticals have been described in the literature, but the absence of reported interactions may again be due to the fact that fritillaria extract is not the sole ingredient in any Chinese medicine, and in fact, is often a minor ingredient.

Tradition dictates that fritillaria not be combined with **aconite** root (*wu tou*) or *qin jiao (Gentiana macrophylla)*.

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Frostbite and frostnip

Definition

Frostbite is localized tissue injury that occurs because of exposure to freezing or near freezing temperatures. Frostnip is a milder cold injury that does not cause tissue loss.

Description

In North America, frostbite is largely confined to Alaska, Canada, and the northern states. In recent years, there has been a substantial decline in the number of cases. This is probably for several reasons, including better winter clothing and footwear and greater public understanding of how to avoid cold-weather dangers. At the same time, the nature of the at-risk population has changed. Rising numbers of homeless people have made frostbite an urban as well as a rural public health concern. The growing popularity of outdoor winter activities has also expanded the at-risk population.

Frostbite on hand. *(Southern Illinois University / Photo Researchers, Inc.)*

Causes and symptoms

Frostbite

Skin exposed to temperatures a little below the freezing mark can take hours to freeze, but very cold skin can freeze in minutes or seconds. Air temperature, wind speed, and moisture all affect how cold the skin becomes. A strong wind can lower skin temperature considerably by dispersing the thin protective layer of warm air that surrounds our bodies. Wet clothing readily draws heat away from the skin. The evaporation of moisture on the skin also produces cooling. For these reasons, wet skin or clothing on a windy day can lead to frostbite even if the air temperature is above the freezing mark.

The extent of permanent injury, however, is determined more by the length of time the skin is frozen than by how cold the skin and the underlying tissues become. Thus, homeless people and others whose self-preservation instincts may be clouded by alcohol or psychiatric illness face a greater risk of frostbite-related amputation. They are more likely to stay out in the cold when prudence dictates seeking shelter or medical attention. Alcohol also affects blood circulation in the extremities in a way that can increase the severity of injury, as does **smoking**. A review of 125 Saskatchewan frostbite cases found a tie to alcohol in 46% and to psychiatric illness in 17%. Driving in poor weather can also be dangerous: vehicular failure was a predisposing factor in 15% of the Saskatchewan cases.

Frostbite is classified by degree of injury (first, second, third, or fourth), or simply divided into two types, superficial (corresponding to first- or second-degree

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KEY TERMS

Amputation—Surgical removal of an extremity.

Edema—Excess tissue fluid.

injury) and deep (corresponding to third- or fourth-degree injury). Most frostbite injuries affect the feet or hands. The remaining 10% of cases typically involve the ears, nose, cheeks, or penis. Once frostbite sets in, the affected part begins to feel cold and, usually, numb; this is followed by a feeling of clumsiness. The skin turns white or yellowish. Many patients experience severe **pain** in the affected part during rewarming treatment and an intense throbbing pain that arises two or three days later and can last days or weeks. As the skin begins to thaw during treatment, **edema** often occurs, causing swelling in the area. In second- and higher-degree frostbite, **blisters** appear. Third-degree cases produce deep, blood-filled blisters and, during the second week, a hard black eschar (scab). Fourth-degree frostbite penetrates below the skin to the muscles, tendons, nerves, and bones. In severe cases of frostbite, the dead tissue can mummify and drop off. Affected areas are also more prone to infection.

Frostnip

Like frostbite, frostnip is associated with ice crystal formation in the tissues, but no tissue destruction occurs and the crystals dissolve as soon as the skin is warmed. Frostnip affects areas such as the earlobes, cheeks, nose, fingers, and toes. The skin turns pale and numb or tingly until warming begins.

Diagnosis

Frostbite diagnosis relies on a physical examination and may also include conventional radiography (x rays), angiography (x-ray examination of the blood vessels using an injected dye to provide contrast), **thermography** (use of a heat-sensitive device for measuring blood flow), and other techniques for predicting the course of injury and identifying tissue that requires surgical removal. During the initial treatment period, however, severity is difficult to judge. Diagnostic tests only become useful 3-5 days after rewarming, once the blood vessels have stabilized.

Treatment

Mechanical treatment

Frostnipped fingers are helped by blowing warm air on them or holding them under one's armpits. Other frostnipped areas can be covered with warm hands. The injured areas should never be rubbed.

By contrast, emergency medical help should always be sought whenever frostbite is suspected. While waiting for help to arrive, one should, if possible, remove wet or tight clothing and put on dry, loose clothing or wraps. A splint and padding are used to protect the injured area. Rubbing the area with snow or anything else is dangerous. The key to prehospital treatment is to avoid partial thawing and refreezing, which releases more mediators of inflammation and makes the injury substantially worse. For this reason, the affected part must be kept away from heat sources such as campfires and car heaters. Experts advise rewarming in the field only when emergency help will take more than two hours to arrive and refreezing can be prevented.

Because the outcome of a frostbite injury cannot be predicted at first, all hospital treatment follows the same route. Treatment begins by rewarming the affected part for 15-30 minutes in water at a temperature of 104-108°F (40-42.2°C). This rapid rewarming halts ice crystal formation and dilates narrowed blood vessels. **Aloe** vera (which acts against inflammatory mediators) is applied to the affected part, which is then splinted, elevated, and wrapped in a dressing. Milky blisters are debrided (cleaned by removing foreign material), and hemorrhagic (blood-filled) blisters are simply covered with aloe vera.

Hydrotherapy

Alternative practitioners suggest several kinds of treatment to speed recovery from frostbite after leaving the hospital. Bathing the affected part in warm water or using contrast **hydrotherapy** can enhance circulation. Contrast hydrotherapy involves a series of hot and cold water applications. A hot compress (as hot as the patient can stand) is applied to the affected area for three minutes followed by an ice-cold compress for 30 seconds. These applications are repeated three times each, ending with the cold compress. For patients who have been hospitalized with frostbite, hydrotherapy should only be performed after checking with a physician to ensure it is done correctly and does not aggravate the condition.

Homeopathy

Homeopathic *Hypericum* (*Hypericum perforatum*) is recommended when nerve endings are affected (especially in the fingers and toes) and *Arnica* (*Arnica montana*) is prescribed for shock and if there is accompanying blunt trauma to the frostbitten area.

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Nutritional supplements

Cayenne pepper (*Capsicum frutescens*) can enhance circulation and relieve pain. Drinking hot **ginger** (*Zingiber officinale*) tea also aids circulation.

Other complementary therapies

Other possible approaches include **acupuncture** to avoid permanent nerve damage and **oxygen therapy**.

Allopathic treatment

In addition to the necessary rewarming and debridement, a **tetanus** shot and antibiotics may be used to prevent infection. The patient is given ibuprofen to combat inflammation. Narcotics are needed in most cases to reduce the excruciating pain that occurs as sensation returns during rewarming. Except when injury is minimal, treatment generally requires a hospital stay of several days, during which hydrotherapy and physical therapy are used to restore the affected part to health. Experts recommend a cautious approach to tissue removal, and advise that 22-45 days must pass before a decision on amputation can safely be made.

Expected results

The rapid rewarming approach to frostbite treatment, pioneered in the 1980s, has proved to be much more effective than older methods in preventing tissue loss and amputation. The extreme, throbbing pain that many frostbite patients endure for days or weeks after rewarming is not the only prolonged symptom of frostbite. During the first weeks or months, people often experience tingling, a burning sensation, or a sensation resembling shocks from an electric current. Other possible consequences of frostbite include changes of skin color, nail deformation or loss, joint stiffness and pain, hyperhidrosis (excessive sweating), and heightened sensitivity to cold. For everyone, a degree of sensory loss lasting at least four years—and sometimes a lifetime—is inevitable.

Prevention

With the appropriate knowledge and precautions, frostbite can be prevented even in the coldest and most challenging environments. Appropriate clothing and footwear are essential. To prevent heat loss and keep the blood circulating properly, clothing should be worn loosely and in layers. Covering the hands, feet, and head is also crucial for preventing heat loss. Outer garments need to be wind and water resistant, and wet clothing and footwear must be replaced as quickly as possible. Alcohol and drugs should be avoided because of their harmful effects on judgment and reasoning. Experts also warn against alcohol use and smoking in the cold because of the circulatory changes they produce. Paying close attention to the weather report before venturing outdoors and avoiding unnecessary risks such as driving in isolated areas during a blizzard are also important.

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Judith Turner

Fructooligosaccharides

Description

Fructooligosaccharides (FOS) are a type of non-digestible oligosaccharide, a short-chain polysaccharide (sugar molecule or type of carbohydrate).

FOS are found naturally in various fruits, vegetables, and grains, including bananas, tomatoes, onions, asparagus, leeks, **garlic**, edible burdock, wheat, rye and barley. FOS are also found in concentrated amounts in **chicory** root and artichokes, particularly the tuber of the Jerusalem **artichoke**. The majority of FOS products are commercially made from sucrose as

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a starting carbohydrate material, and use a food-grade fungal enzyme called fructosyltransferase to make the FOS from sucrose. Most of the commercially derived FOS products come from chicory root (*Cichorium intybus)*, which contains significant quantities of inulin, a fiber in many fruits and vegetables.

Both FOS and inulin are recognized as natural food ingredients (not additives) in most European countries and have been labeled generally regarded as safe by the U.S. Federal Drug Administration (FDA). FOS are also considered functional foods, defined by the International Food Information Council as dietary components that provide a health benefit beyond basic **nutrition**. FOS are categorized as prebiotics, non-digestible food ingredients that escape digestion by passing through the stomach into the intestines, where they ferment and selectively stimulate the growth and/or activity of certain colonic bacteria. When FOS are consumed, they aid digestion by encouraging the growth of healthy intestinal microflora (**probiotics** or beneficial bacteria known as bifidobacteria or bifidus), such as *bifidobacteria* and *lactobacilli*. FOS are completely fermented in the colon by certain components of the microflora, so they are not excreted in feces.

Increasing beneficial bacteria in the digestive tract promotes gastrointestinal health, enhancing the digestion and absorption of nutrients and boosting the immune system by reducing the activity of potentially harmful or cancer-promoting bacterial enzymes, such as *E. coli,* clostridia, and coliforms. FOS aid in the synthesis of vitamins B_2 (**riboflavin**), B_3 (**niacin**), B_6 (pyridoxine), **folic acid**, and **biotin** by boosting the bacteria's ability to synthesize these key vitamins. FOS also stimulate the production of lactate and short-chain fatty acids, especially butyrate.

In 2008 research was ongoing to determine the function of prebiotics on the metabolism of ingested and existing microflora in the colon. Studies were also underway to determine how prebiotics affect certain physiological functions such as bowel function, and how they alter certain diseases or reduce the risk of diseases. In addition, labeling terminology, including product health claims, were still being determined for products containing FOS by the FDA under the Nutrition Labeling and Health Education Act of 1995.

General use

FOS have two general uses, as artificial sweeteners and as prebiotics. Because FOS are non-digestible, they provide almost no calories and are used in many foods as artificial sweeteners. They have about half the sweetness of sugar and provide bulk and flavor to certain dairy products, baked goods, and beverages.

Case reports from both animal and human studies have shown a wide variety of health benefits associated with FOS supplementation, including reduced risk of **diarrhea**, **osteoporosis**, **bladder cancer**, and colon **cancer**; improved management for inflammatory bowel diseases, including **Crohn's disease**; lowered total **cholesterol** and LDL cholesterol levels; as well as treatment for lactose intolerance, bacterial vaginosis, vaginal candidiasis (**yeast infection**), **allergies**, and diarrhea associated with antibiotic use. As more data from human trials continue to be published about the beneficial effects of FOS supplementation, scientific evidence will be available to support health risk reduction claims.

Several studies indicate FOS are especially beneficial to infants, reducing the incidence of diarrhea and the risk of infection, including upper respiratory tract **infections**. One study showed a decreased incidence of clinical **eczema** in infants. A November 2007 double-blind, placebo-controlled study published in the *Journal of Nutrition* demonstrated the immune-protective properties of long-chain FOS supplementation in formula-fed infants during the first six months of life. The health benefits of FOS supplementation in this study were comparable to human milk oligosaccharides, indicating the potential for preventing infections and reducing allergies. More research was needed to determine the role of prebiotic supplementation of infant formula for the prevention of allergies and food hypersensitivities.

FOS supplementation also appears to benefit older adults. Results from a December 2007 study published in the *Nutrition Journal* showed that dietary FOS significantly increased fecal bifidobacteria (beneficial bacteria) in adults aged 69 and older, which in turn stimulated the immune system and intestinal immunoglobulin A in the small intestine and colon.

Preparations

Commercial FOS products are available as bulk powder or in capsule form. Preparations may be composed of single FOS components or mixtures of FOS and other oligosaccharides. FOS-containing products include inulin-type fructans, inulin, and oligofructose.

The appropriate doses and mixtures of FOS and oligosaccharides to yield maximum positive health benefits were unknown as of 2008, but studies had shown that a well-tolerated, optimal dosage is 10 g of FOS supplement per day to yield gastrointestinal benefits. A dosage of less than 3 g per day did not appear to increase beneficial colonic bacteria.

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KEY TERMS

Inulin—A carbohydrate belonging to a class of compounds known as fructans. Inulin fiber is resistant to digestion in the upper gastrointestional tract, so it reaches the large intestine essentially intact.

Microflora—Beneficial bacteria in the intestines. Microflora reinforce the barrier function of the intestinal mucosa to help prevent the attachment of pathogenic microorganisms and the entry of allergens.

Oligosaccharide—A carbohydrate consisting of three to six units of simple sugars (monosaccharides). A large number of oligosaccharides have been prepared by partially breaking down more complex carbohydrates (polysaccharides).

Polysaccharide—A complex carbohydrate that characterizes most forms of carbohydrates.

Prebiotics—Non-digestible food ingredients that pass through the stomach into the intestines, where they selectively stimulate the growth and/or activity of healthy colonic bacteria.

Probiotics—Live microorganisms or bacteria that, when administered in adequate amounts, confer a health benefit on the host.

Precautions

FOS dietary supplements are generally safe when taken according to proper dosing guidelines. FOS supplementation may not be appropriate for people who have severely weakened immune systems due to disease or cancer treatments, as they can develop serious infections, including bacterial blood infections. People who have recently had bowel surgery, have intestinal damage, or have **inflammatory bowel disease** should not take FOS supplements without first consulting their physician. There is a rare risk of heart valve infections, particularly in people who have artificial heart valves, so patients with heart valve disease should consult their doctor before taking FOS supplements.

Studies have been conducted in pregnant women and infants, and no adverse effects related to fetal development during **pregnancy** or to breastfed infants have been reported.

Side effects

Severe, adverse or toxic effects of FOS supplementation have not been published in the research as of 2008. Ingesting products containing FOS may result in mild gastrointestinal discomfort, including excess **gas**, abdominal cramps, and bloating, which typically subside within two weeks after initiating therapy. Symptoms are dependant on the dosage and appear to be more prevalent with higher doses. To minimize side effects, practitioners recommend starting with a low dose of FOS and increasing it gradually until the desired maximum dose is achieved. People who are sensitive to lactose may develop abdominal discomfort from dairy products containing FOS.

Interactions

Limited research has shown that alcohol interferes with the action of FOS, so practitioners recommend that alcohol be avoided while taking FOS supplements. Some studies have shown that antibiotics damage bifidobacteria, so FOS should be taken two to three hours after antibiotic doses. Other drug interactions have not been determined, as most supplements, including FOS, have not been thoroughly tested for interactions with other herbs, supplements, drugs, or food.

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Food and Agricultural Organization of the United Nations, http://www.fao.org/.

Food and Nutrition Information Center, National Agricultural Library, United States Department of Agriculture, 10301 Baltimore Ave., Room 105, Beltsville, MD, 20705, (301) 504-5414, http://fnic.nal.usda.gov/.

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Angela M. Costello

Fungal infections

Definition

Fungi are types of parasitic plants that include molds, mildew, and yeast. A fungal infection is an inflammatory condition in which fungi multiply and invade the skin, the digestive tract, the genitals, and other body tissues, particularly the lungs and liver. Fungal **infections** of the skin are often called ringworm or tinea.

Description

Microscopic fungi, which are called dermatophytes, often live exclusively on such dead body tissues as hair, the outer layer of the skin, and the nails. The fungus grows best in moist, damp, dark places with poor ventilation and on skin that is irritated, weakened, or continuously moist. Superficial fungal infections include tinea capitis, an infection of the neck and scalp; tinea barbae, also called barber's itch, along the beard area in adult males; tinea corporis on parts of the body, such as the arms, shoulders, or face; tinea cruris, or **jock itch**, involving the groin; tinea pedis, or **athlete's foot**; tinea versicolor; and tinea unguium, or infection of the nails. The term tinea gladiatorum is sometimes used to describe ringworm infections in athletes. Tinea gladiatorum is most common in swimmers, wrestlers, and athletes involved in other contact sports. Fungal infections of the skin and nails are very common in children, but they can affect all age groups.

Systemic fungal infections occur when spores are touched or inhaled, or there is an overgrowth of fungi in or on the body. Such infections are most often a serious problem in individuals with suppressed immune systems. Candidiasis is a rather common fungal infection. When it occurs in the mouth, it is called thrush. Less often, it occurs in the mucous membranes of other parts of the digestive system, or in the vagina, heart valves, urinary tract, eyes, or blood. Other systemic fungal infections include aspergillosis, which mostly affects the lungs and may also spread to the brain and kidneys; blastomycosis, a lung infection that may spread through the bloodstream; coccidioidomycosis, also known as San Joaquin or valley **fever**; mucormycosis, which can develop into a serious life-threatening infection; and histoplasmosis.

Causes and symptoms

Fungi are widespread in the environment, so it is not unusual that a certain amount of fungi and their spores end up being inhaled into the lungs or landing on the skin. Under conditions of moisture, warmth, irritation, or injury, these fungi grow rapidly and may cause illness. Superficial fungal infections may be due to an overgrowth of fungi already present, or the infection may be the result of contact with an infected person or with contaminated surfaces, bed sheets, towels, or clothing. Fungal infections can be spread from one part of the body to another by scratching or touching. Additionally, tinea unguium infections have been linked to the use of methyl methacrylate, a glue used for attaching acrylic fingernails.

Fungal spores are often present in soil and are likely to be inhaled when the soil is dug up or otherwise disturbed. Systemic fungal infections are commonly contracted in this way. In addition, fungi that normally inhabit the intestines, such as *Candida albicans*, may multiply, causing an infection due to an overgrowth of the fungi.

Tinea infections usually cause itchy, red, scaly, ring-shaped patches on the skin that spread easily. Hairs in the area of infection often fall out or break off, and the skin may crack. The skin may also develop a secondary bacterial infection. In tinea unguium, the nails discolor, crack, and thicken. Tinea versicolor may cause pigment changes in the skin that persist for up to a year.

Systemic fungal infections develop slowly. Symptoms often may be nonexistent, or there may be only the feeling of having a cold or the flu. Coughing, a fever, chest **pain**, **chills**, weight loss, and difficulty with breathing may become evident. Additional symptoms depend on the type and site of the infection.

Fungal infections are more common and more severe in people taking antibiotics, corticosteroids, immunosuppressant drugs, and contraceptives. Such is also the case in people with endocrine disorders, immune diseases, and other conditions such as **obesity**, **AIDS**, **tuberculosis**, major **burns**, **leukemia**, and **diabetes mellitus**. Fungal infections often occur due to the use of antibiotic drugs for other conditions because antibiotics kill off the bacteria that normally keep fungi at bay.

Diagnosis

Fungal infections of the skin, hair, and nails often can be diagnosed based on the characteristic

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appearance of affected areas. A **potassium** hydroxide (KOH) prep is a simple laboratory test to confirm the diagnosis. The test uses tissue samples treated with a 20% potassium hydroxide solution to detect fungi. Examining the skin with a Wood's ultraviolet lamp is another easy and convenient method to determine the presence of a fungus. Culture and sensitivity testing can be used if a more definitive diagnosis is required. Systemic fungal infections may be initially diagnosed from blood tests. Confirmation is determined by cultures made from sputum, blood, urine, bone marrow, or infected tissue samples.

Treatment

Among the herbs that slow down or halt the growth of fungus are **goldenseal** (*Hydrastis canadensis*), **myrrh** (*Commiphora molmol*), **garlic** (*Allium sativa*), **pau d'arco** (*Tabeebuia impestiginosa*), **turmeric** (*Curcuma longa*), oregano (*Origanum vulgare*), cinnamon (*Cinnamonum zeylanicum*), jewelweed, **sage** (*Salvia officinalis*), *Impatiens aurea*, **yellow dock** (*Rumex crispus*), the lichen known as old man's beard (*Usnea barbata*), **black walnut** husks and bark (*Juglans nigra*), **licorice** (*Glycyrrhiza glabra*), and *Calendula officinalis*. These herbs can be applied to external fungus as infusions, salves, powders, or vinegars. Many of them can also be taken internally as capsules or tinctures. Antifungal herbs can be quite strong and care should be taken that a given remedy is suitable for internal use.

When an infusion is used, the affected area should be washed or soaked in the herbal water for at least 15 minutes twice daily. Store-bought or homemade tea bags can be soaked in water or vinegar for about 10 minutes and then used as a poultice for the same effect. Herbal vinegars make excellent remedies for fungus, as vinegar is in itself antifungal. Special vinegars with such antifungal ingredients as oregano and garlic are often readily available at grocery stores. The vinegar can be applied a few times daily with cotton or compresses. In addition, a bentonite clay dusting powder can be useful for drying out the environment of moist skin in which fungus thrives. It works best when mixed with powdered antifungal herbs such as myrrh or goldenseal. Dusting powder is especially helpful for athlete's foot.

Many herbs high in **essential oils** also have antifungal action, particularly tea tree (*Melaleuca alternifolia*), oregano, **lavender** (*Lavandula officinalis*), *Eucalyptus* spp., rose geranium (*Pelargonium graveolens*), **peppermint** (*Mentha piperita*), **chamomile** (*Matricaria recutita*), and myrrh. Peppermint oil is especially helpful in relieving the **itching** associated with many fungal infections. The simplest way to use **aromatherapy** to fight fungal infections is to add several drops of any single essential oil or combination of oils to bathwater. Essential oil can also be added to mixtures for soaking or compresses. Tea tree is the herb most frequently recommended for the treatment of superficial fungal infections. As with all essential oils, the full-strength oil should be diluted in a carrier. A dilution of **tea tree oil** can be made by adding the essential oil to a carrier oil. This mixture can be applied directly to the site of a skin infection.

A healthy diet should be maintained. Foods that are high in yeast, such as beer and wine, breads, and baked goods should be avoided. Fermented foods and sugary foods, including honey and fruit juices, should also be avoided until symptoms have cleared. Antifungal culinary herbs such as garlic, turmeric, oregano, sage, and cinnamon should be used liberally in foods. Yogurt containing live cultures can be incorporated into the diet to supply needed gut bacteria and help reduce digestive infections such as candidiasis and thrush. *Lactobacillus acidophilus* and *Lactobacillus bulgaricus* can also be taken directly as supplements.

Supplements that can be taken for fungal infections include vitamins A, B complex, C, and E. Caprylic acid, an extract of the coconut plant, is also recommended as an antifungal, as well as **grapefruit seed extract**. **Essential fatty acids**, contained in **evening primrose oil**, fish liver oil, or **flaxseed** oil, can help reduce the inflammation of systemic or superficial fungal infections. A dose of one of these oils is recommended as a daily supplement.

Allopathic treatment

Superficial fungal infections are usually treated with such antifungal creams or sprays as tolnaftate (Aftate or Tinactin), clotrimazole, miconazole nitrate (Micatin products), econazole, ketoconazole, ciclopirox, naftifine, itraconazole, terbinafine hydrochloride, fluconazole, or Whitfield's tincture made of salicylic acid and benzoic acid. If the infection is resistant, a doctor may prescribe an oral antifungal drug such as ketoconazole or griseofulvin. Drugs used for systemic infections include amphotericin B, which is highly toxic and is used for severe or life-threatening infections; the azoles, particularly fluconazole and itraconazole, which have been found to be the least toxic of these medications; and flucytosine alone or in combination with other antifungal medications. Fungal infections that become inflamed may be treated with a combination antifungal/steroid medication. Certain infections may require surgery.

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KEY TERMS

Azole—Any member of a group of chemical compounds with five-membered rings containing one or more nitrogen atoms. Several azoles are used as antifungal medications.

Bentonite clay—A green clay of aluminum silicate containing magnesium and trace minerals. The clay can draw out agents of infection.

Dermatophyte—A type of fungus that is parasitic on skin and causes a skin disease.

Tinea—Any of several fungal infections of the skin, especially ringworm.

Expected results

Infections usually respond to treatment within several weeks. However, many fungal infections are resistant to treatment, and it may take an extended time and repeated treatments to effect a cure. Infections may spread, and secondary bacterial infections may develop. Medications for fungal infections are often strong, and their use may cause such undesirable side effects as **headache**, **dizziness**, **nausea**, **vomiting**, or abdominal pain. Fungal infections are usually not serious in otherwise healthy individuals. However, a systemic fungal infection may be severe and life-threatening for those with compromised immune systems.

Prevention

Good personal hygiene should be maintained. In the case of superficial infections, the skin should be kept clean and dry, and care should be taken to avoid contact with other parts of the body. If someone in the household has a superficial fungal infection, bed sheets, towels, floors, shower stalls, and other contact surfaces should be washed with hot water and disinfected after use.

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American Academy of Dermatology, PO Box 4014, Schaumburg, IL, 60618-4014, (866) 503-7546, (847) 240-1280, http://www.aad.org.

American Skin Association, 346 Park Ave. South, 4th floor, New York, NY, 10010, (800) 499-SKIN, (212) 889-4858, http://www.americanskin.org.

National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS), National Institutes of Health, 1 AMS Circle, Bethesda, MD, 20892-3675, (877) 226-4267, (301) 495-4484, http://www.niams.nih.gov.

Patience Paradox
Rebecca J. Frey, PhD
Angela M. Costello

Furuncles *see* **Boils**

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G

Gallstones

Definition

Gallstones are solid crystal deposits that form in the gallbladder, a pear-shaped organ that stores bile until it is needed to help digest fatty foods. These crystals can migrate to other parts of the digestive tract, causing severe **pain** and life-threatening complications. Gallstones vary in size and chemical structure. They may be as tiny as a grain of sand, or as large as a golf ball.

Description

Gallstones usually develop in adults between the ages of 20 and 50. The risk of developing gallstones increases with age. Young women are up to six times more likely to develop gallstones than men in the same age group. In patients over 50, however, the condition affects men and women with equal frequency. Native Americans develop gallstones more often than any other segment of the population, and Mexican Americans have the second highest incidence of this disease. Gallstones tend to be passed down genetically in families.

Eighty percent of gallstones are composed of **cholesterol**. They are formed when the liver produces more cholesterol than the digestive juices can liquefy. The remaining 20% of gallstones are composed of **calcium** and an orange-yellow waste product called bilirubin, which gives urine its characteristic color and sometimes causes **jaundice**.

People who have gallstones may remain without symptoms for an extended period, especially if the stones remain in the gallbladder. In most cases, medical treatment is only deemed necessary if the individual is experiencing symptoms. When symptoms do appear, it is usually because the stones have left the gallbladder and are stuck somewhere else within the biliary system, blocking the flow of bile. If gallstones remain stuck in the biliary system, there can be damage to the liver, pancreas, or the gallbladder itself.

Gallstones bring on several disorders including:

- Cholelithiasis: Gallstones within the gallbladder itself. Pain is caused by the contractions of the gallbladder around the stone.
- Choledocholithiasis: The presence of gallstones within the common bile duct, which is the passage that empties into the small intestine. Once discovered, common duct stones need to be removed in order to avoid further problems.
- Cholecystitis: A disorder marked by inflammation of the gallbladder. It is usually caused by the passage of a stone from the gallbladder into the cystic duct, which connects the gallbladder to the common bile duct. Cholecystitis causes painful enlargement of the gallbladder and is responsible for 10–25% of all gallbladder surgery.

Causes and symptoms

Gallstones are caused by an alteration in the chemical composition of bile, which is a fluid that helps the body break down and absorb fats. It is widely held that a diet high in fats and processed foods, and low in fiber and whole foods, is a strong contributor to gallstone formation. High levels of estrogen, insulin, or cholesterol can increase a person's risk of developing gallstones. If left untreated, the risk of developing **anemia** is also increased.

Gallbladder attacks usually follow a meal of rich foods, typically high in fat. The attacks often occur in the middle of the night, sometimes waking the patient with such intense pain that the episode ends in a visit to the emergency room. Pain often occurs on the right side of the body. The pain of a gallbladder attack begins in the abdomen and may radiate to the chest, back, or the area between the shoulders. Other symptoms of gallstones include inability to digest fats, low **fever**, **chills**

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KEY TERMS

Bile—A bitter, greenish liquid secreted by the liver that aids in the digestion and absorption of fats.

Cholecystectomy—Surgical removal of the gallbladder.

Common bile duct—The passage through which bile travels from the cystic duct to the small intestine.

Lithotripsy—A nonsurgical technique for removing gallstones by breaking them apart with high-frequency sound waves.

and sweating, **nausea** and **vomiting**, **indigestion**, **gas**, belching, and clay-colored bowel movements.

Pregnancy or the use of birth control pills slow down gallbladder activity and increase the risk of gallstones, as do diabetes, **pancreatitis**, and **celiac disease**. This is due to an individual's higher levels of cholesterol, insulin, or estrogen from oral contraceptives. Other factors that may encourage gallstone formation are:

- infection
- anemia
- obesity
- intestinal disorders
- coronary artery disease
- multiple pregnancies
- a high-fat, low-fiber diet
- smoking
- heavy drinking
- rapid weight loss

Diagnosis

When gallstones are suspected, blood tests for liver enzyme levels are often given. The levels are usually elevated when the stone cannot pass through the cystic duct or bile duct. Test results, taken together with symptom history and a physical exam, are simple and relatively inexpensive for diagnosing the presence of gallstones. However, ultrasound is the method of choice for a definite diagnosis. It has a high degree of accuracy, except in diagnosing cholecystitis (a stone in the cystic duct). Cholescintigraphy is an alternative method of diagnosis, in which radioactive dye is injected and photographed as it passes through the biliary system.

Treatment

An allergic reaction to certain foods may contribute to gallbladder attacks. These foods should be identified and removed from the diet, or at least seriously limited. Foods that might possibly bring on allergic reactions include eggs, pork, onions, chicken, milk, coffee, citrus, corn, nuts, and beans.

Other dietary changes may help relieve the symptoms of gallstones. Generally, a vegetarian diet is protective against the formation of gallstones. Recurrent attacks can be diminished by maintaining a healthy weight and a healthy diet.

Choleretic herbs encourage the liver to secrete bile. They help maintain the appropriate chemical composition of bile so that it does not form stones. These herbs include:

- A tincture of dandelion (*Taraxacum officinale*), 2–6 ml once daily.
- Milk thistle seeds (*Sylibum marianum*), a dose equivalent to 70–210 mg of silymarin.
- Artichoke leaves (*Cynara scolymus*), 150 mg three times per day.
- Turmeric (*Curcuma longa*), used as a spice; 150 mg three times per day.

Use of the above herbs cause some possible reactions, such as gas, **diarrhea**, nausea, and indigestion.

Other therapeutic approaches that have been found to be helpful in treating gallstones include **homeopathy**, traditional Chinese herbal medicine, and **acupuncture**. Knowledgeable practitioners should be consulted.

Allopathic treatment

Watchful waiting

One-third of all patients with gallstones never experience a second attack. For this reason, many doctors advise an attitude of "wait and see" after the first episode. Changing the diet or following a sensible weight loss plan may be the only treatments required. A person having only occasional mild gallstone attacks may be able to manage them by using nonprescription forms of acetaminophen, such as Tylenol or Anacin. A doctor should be notified if pain intensifies or lasts for more than three hours; if the fever rises above 101°F (38.3°C); or if the skin or whites of the eyes have a yellowish cast.

Surgery

Surgical removal of the gallbladder, called cholecystectomy, is the most common conventional treatment for recurrent or worsening gallstone attacks. However,

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surgery is unecessary in most cases where the gallstones remain without symptoms. Laparoscopic cholecystectomy is the technique most widely used. It has mostly replaced traditional open surgery because of a shorter recovery time, decreased pain, and reduced scarring. However, the open surgery procedure is still used in about 5% of cases because of various complications.

Nonsurgical therapy

If surgery is considered inappropriate, gallstones can be dissolved in 30–40% of patients by taking bile acids in tablet form. Dissolution of gallstones by this method may take many months or years depending on the size. Unfortunately, recurrence of stones is common after cessation of the medication.

Lithotripsy uses high-frequency sound waves directed through the skin to break up the stones. The process can be combined with the use of bile acid tablets. Lithotripsy requires special equipment and is not always readily available.

Direct cholangiography can be used to remove gallstones by contact dissolution. The procedure is used to insert a catheter to inject medication into the gallbladder. Stones are often dissolved within a few hours by this method.

Expected results

Forty percent of all patients with gallstones have "silent gallstones" that do not require treatment. If symptoms develop, then medical intervention may become necessary. Gallstone problems requiring treatment may also develop **infections** that require antibiotics. In rare instances, severe inflammation can cause the gallbladder to burst, causing a potentially fatal situation. The gallbladder is not an organ that is required to retain health. It can be successfully removed, with no recurrence of stones. Fat digestion, however, becomes more difficult after surgery, since the gallbladder is no longer there to store and release bile as needed.

Prevention

It is easier, in general, to prevent gallstones than to reverse the process. The best way to prevent gallstones is to minimize risk factors. Since gallstones seem to develop more often in people who are obese, eating a balanced diet, exercising, and losing weight may help keep gallstones from forming. In addition, a diet high in dietary fiber and low in fats, especially saturated fats, is recommended. Processed foods should be replaced by complex carbohydrates, such as whole grains.

Increased intake of fluids will dilute the bile and inhibit gallstone formation. Six to eight glasses of water should be consumed daily, along with plenty of herbal teas and diluted juices.

Recent studies indicate that consumption of about two tablespoons of olive oil per day, which can be mixed with food, helps reduce cholesterol levels in the bloodstream and the gallbladder. Large amounts of olive oil, taken as a so-called liver flush, should be avoided. This method can **stress** the gallbladder and lead to an emergency situation.

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Patience Paradox

Gamma-linoleic acid

Description

Gamma-linoleic acid (GLA) is an omega-6 polyunsaturated fatty acid made in the body from linolenic acid, an essential fatty acid (EFA). GLA is the product

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of the body's first biochemical step in the transformation of a major essential fatty acid, linolenic acid (LA), into important prostaglandins. Prostaglandins are essential to the proper functioning of each cell. Every cell's structure in the human body depends on fatty acids formed from GLA.

The amount of GLA found in the seed oils of evening primrose (*Oenothera biennis L.*) is 10%, borage (*Borago officinalis L.*) 17%, and black currant (*Ribes nigrum L.*) 23%.

General use

Evening primrose oil (EPO), very high in GLA, has been used for decades to treat medical conditions. Native American women chewed evening primrose seeds to relieve menstrual problems. Evening primrose was also used by Native Americans and early American settlers from Europe to treat coughs and stomach problems. In the 1800s, the leaves of the plant were used to treat several skin conditions.

EPO was imported to Europe during the 1600s and 1700s, and used to treat **gout**, **rheumatoid arthritis**, headaches, and skin conditions.

In animal studies GLA has been shown to reduce certain inflammations and reduce joint tissue injury. Human studies showed similar findings in its anti-inflammatory effects.

GLA has also been used as a treatment option for a number of conditions, including **alcoholism**, **asthma**, attention deficit/hyperactivity disorder (ADHD), high **cholesterol**, diabetic neuropathy, certain cancers, **eczema** (a skin inflammation), **hypertension** (high blood pressure), **premenstrual syndrome** (PMS), rheumatoid arthritis, and scleroderma (a skin disease).

There is also research data that indicates GLA in combination with other measures may help in treating people with Sjögren's syndrome—a chronic inflammatory disease of the immune system that effects mostly older women.

Other animal studies suggest GLA may enhance **calcium** absorption, helping to reduce calcium loss and osteporosis. **Osteoporosis** is a disease occurring primarily in women after **menopause** in which the bones become very porous, break easily, and heal slowly. It may lead to curvature of the spine after vertebrae collapse.

EPO supplements taken during **pregnancy** may reduce the need for cesarean delivery as studies suggest that EPO may facilitate vaginal delivery when used as a "cervical priming agent."

Among the conditions GLA is most often used for are:

- Rheumatoid arthritis. GLA has been studied for many years for its possible effects in treating arthritis and other inflammatory conditions. GLA has been shown to be most promising in treating people with this crippling condition, due to its anti-inflammatory properties. At least three studies have shown GLA reduces inflammation and joint tissue injury, thereby reducing the pain associated with this condition. In one study, GLA reduced the incidence of tender joints by 36%, and swollen joints by 28%.
- ADHD. Studies suggest that GLA may be helpful (combined with other therapies) for helping to alleviate ADHD symptoms in children.
- Diabetes. Some studies show that GLA can help improve nerve function and help reduce peripheral neuropathy, which causes numbness, tingling, pain, or burning in the feet, legs, and toes and hands, in diabetics. Recent studies have confirmed evening primrose oil as beneficial in the treatment of distal diabetic polyneuropathy, a condition involving multiple nerves.
- High cholesterol. Research indicates that high doses of GLA may improve blood lipid levels in people with high cholesterol. Studies with laboratory animals in 1997 demonstrated the cholesterol-lowering effects of EPO. In one study, rabbits whose diet was supplemented with 15% EPO showed a total cholesterol reduction of 25%. In a 13-week study with rats, EPO dietary supplements of 10–20%, produced lower levels of liver cholesterol than in rats on the same diet, but supplemented with palm oil, soybean oil, sunflower oil, or high-oleic safflower oil.
- Skin conditions. A number of studies have been done regarding GLA and eczema with contradicting results. Several studies showed GLA relieved the symptoms such as itching, redness, and scaling of the skin, to varying degrees. It has also been shown to be helpful in reducing the symptoms of scleroderma and skin inflammations, such as dermatitis.
- Cancer. In vitro or test tube studies have shown GLA has potential to suppress tumor growth and metastasis, the spreading of cancer from the original site to other parts of the body. In one small study, combining vitamin C with the GLA supplement doubled the survival time for 11 patients with liver cancer. GLA has also shown promising results as a cancer therapy when combined with the anticancer drugs tamoxifen and paclitaxol. Research into its effects on cancer are in the earliest stages and GLA cannot

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KEY TERMS

Attention deficit/hyperactivity disorder (ADHD)—A condition, occurring mainly in children, characterized by hyperactivity, inability to concentrate, and impulsive or inappropriate behavior.

Corticosteroids—Drugs used to treat inflammation.

Dermatitis—Inflammation of the skin resulting in redness, swelling, itching, or blistering.

Eczema—An inflammation of the skin characterized by redness, itching, and scaly or crusty patches.

Eicosapeniaenoic acid—A type of acid derived from gamma-linoleic acid.

Essential fatty acids—A group of necessary fats that the human body cannot produce on its own and must be obtained through diet.

Femur—The main bone in the human thigh and the strongest bone in the body.

Gout—A painful disease, mainly of the toes and feet, that causes swollen joints.

Hypertension—High blood pressure, which if untreated, can lead to heart disease and stroke.

Lipids—A group of organic compounds consisting of fats, oils, and related substances that, along with proteins and carbohydrates, are the structural components of living cells.

Lumbar vertebrae—Five bones in the lower spine.

Metastasis—The spreading of cancer from the original site to other parts of the body.

Nonsteroidal anti-inflammatory drugs (NSAIDS)—A class of drugs used to treat inflammation and pain.

Omega-6 fatty acids—A group of essential fatty acids that the humans body cannot produce on its own and must be obtained through diet.

Osteoporosis—A disease occurring most commonly in women after menopause in which the bones become very porous, break easily, and heal slowly. It may lead to curvature of the spine after vertebrae collapse.

Paclitaxol—A drug used to treat some forms of cancer.

Peripheral neuropathy—A nerve disease associated with diabetes that causes numbness, tingling, pain, or burning in the feet, legs, and toes.

Polyunsaturated—A group of fats that are less likely to be converted into cholesterol in the body than other fats.

Premenstrual syndrome (PMS)—A group of symptoms, including nervous tension, irritability, tender breasts, and headache, experienced by some women in the days before menstruation caused by changes in hormone levels.

Prostaglandin—An unsaturated fatty acid in humans that helps to control smooth muscle contraction, blood pressure, inflammation, and body temperature.

Rheumatoid arthritis—Inflammation of joints that causes stiffness and damage to joints.

Scleroderma—A skin disease.

Sjögren's syndrome—A chronic inflammatory disease that effects mostly older women, causing dry eyes and mouth.

Tamoxifen—A drug used to treat cancer.

Triglycerides—A chemical compound in many of the fats and oils of animal and vegetable tissues and, like cholesterol, can have an adverse effect on human health in excessive amounts.

Vasodilatation—A widening of the blood vessels.

be said to prevent or cure any type of cancer. However, it has been reported recently that GLA supplementation may restore normal prostaglandin E series metabolism and thus act to inhibit carcinogenesis.

- Hypertension. Several studies suggest GLA may help reduce blood pressure in some people with hypertension and thereby decrease the risk of heart attacks. Results of these studies are not considered conclusive.
- PMS. Studies show GLA is remarkably helpful in treating some PMS symptoms. One study showed that of the women who took the drug Efamol, which contains 9% GLA, 61% experienced complete relief from symptoms while 23% had partial relief. These symptoms included breast tenderness, depression, irritability, swelling, and bloating.

GLA, in combination with eicosapentaenoic acid (EPA), in the form of borage seed and fish oils, significantly reduced the need for breathing support in patients with the lung condition acute respiratory distress syndrome. It cut the average number of days a patient is in a hospital's intensive care unit from 17.5 to 12.8, according to a study published in the August 1999 issue of *Critical Care Medicine*.

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Preparations

Gammalinoleic acid is found naturally in fish, animal organs such as liver, and certain plant seed oils. The major sources of GLA are **borage oil** (18–27% GLA), black currant oil (15–20% GLA), and evening primrose oil (7–14% GLA). GLA is not available as a pure extract, but only as an ingredient in combination formulas.

Dosage varies by condition it is used to treat:

- skin conditions: 360–750 mg daily
- PMS: 240–320 mg daily
- rheumatoid arthritis: 750 mg–2.8 g daily for six to 12 months
- diabetic neuropathy: 480 mg daily
- high blood pressure: 1.3 g daily
- high cholesterol: Up to 2 g daily

The United States Food and Drug Administration (FDA) has not established recommended daily allowances (RDA) for GLA.

Patients should consult with a heathcare professional regarding the proper dosage.

Several forms of GLA supplements are available, including a concentrated form. It is also available as evening primrose oil, borage oil, and **black currant seed oil**. It is also available in multi-nutrient formulas that often contain any combination of **fish oil**, flax seed oil, **omega-6 fatty acids**, and **essential fatty acids**. The usual amount of GLA in these is from 200–400 mg per capsule. The cost of a bottle of 30 capsules ranges from $8 to $15. The concentrations of GLA in these oils varies and the number of capsules needed depends on the amount of GLA.

Precautions

GLA should not be used by women who are pregnant or breastfeeding without consulting a physician. Hemophiliacs and people who take the blood-thinning drug warfarin (Coumadin) should consult a physician before taking GLA. It should also not be taken before surgery because it may increase bleeding. Persons with high blood pressure or heart or blood vessel conditions should consult a physician before taking GLA.

Side effects

There is no evidence that GLA is toxic in daily doses of up to 2.8 g. There have been no reports of serious side effects by people taking GLA supplements. It is generally well tolerated by most people. Possible minor side effects include upset stomach, **diarrhea**, soft stool, bloating, and **gas**. Persons who take GLA and experience difficulty breathing, chest or throat tightness, chest **pain**, **hives**, rash, or itchy or swollen skin may be allergic to it. They should stop taking it and consult a physician immediately.

Interactions

No adverse interactions between GLA and other medications, vitamins, or nutritional supplements have been reported.

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Ken R. Wells
Clare Hanrahan

Gangrene

Definition

Gangrene is a term used to describe the decay or death of an organ, tissue, or bone caused by a lack of oxygen and nutrients. It is a complication resulting from tissue injuries (such as **frostbite**), the obstruction of blood flow, or the processes of chronic diseases such as **diabetes mellitus**. Externally, the hands and feet are the areas most often affected by gangrene; internally, it is most likely to affect the gallbladder and the intestines. Gangrene is referred to as wet, or moist, if a bacterial infection is involved. In dry gangrene, there is no infection.

Description

Gangrene is often characterized by **pain** followed by numbness. The infection may first go unnoticed, especially in the elderly or those individuals with a loss of sensation. The area affected by gangrene may be cold and pale, especially early in the disease. **Blisters** may be apparent and the patient may experience an increased heart rate and profuse sweating. As the tissue dies, the skin begins to darken. The dead tissue gradually separates and falls away from the healthy tissue.

Dry gangrene is often seen in advanced cases of diabetes and arteriosclerosis. The tissue does not become infected, rather it dries out and shrivels over a period of weeks or months. Wet gangrene progresses much more rapidly. The affected area becomes swollen and gives off a foul smelling discharge. Death may occur within a matter of hours or days. **Fever**, rapid heart rate, rapid breathing, altered mental state, loss of appetite, **diarrhea**, **vomiting**, and vascular collapse may occur as the infection progresses.

KEY TERMS

Amputation—The surgical removal of a part of the body.

Antitoxin—A vaccine used to stimulate immunity against a specific disease.

Arteriosclerosis—A disease characterized by build-up on the artery walls that can lead to the obstruction of blood flow.

Debridement—The surgical removal of dead tissue.

Raynaud's disease—A condition in which there is poor circulation and decreased oxygen in the hands and feet particularly.

Torsion—The accidental twisting of tissues in the body that may decrease the blood and oxygen supply to the affected area.

Causes and symptoms

The primary cause of gangrene is often an injury to the blood vessels, causing either an interruption of blood flow, the introduction of a bacterial infection, or both. Such injuries may include **burns**, infected **bedsores**, **boils**, frostbite, compound **fractures**, deep **cuts** or gunshot **wounds**. Gangrene can also develop due to the poor circulation and obstructions in the blood vessels associated with abnormal **blood clots**, torsion of organs, and diseases such as diabetes, **heart disease**, and Raynaud's disease. Gangrene of the internal organs may be attributed to a ruptured appendix, internal wounds, or the complications of surgery.

The bloodstream is the body's main transport system. When blood flow is diminished, the flow of the oxygen and nutrients needed to keep tissues healthy is greatly decreased. The white blood cells needed to fight infection are not readily available. In such an environment, invading bacteria thrive and multiply quickly. *Streptococcus* spp. and *Staphylococcus* spp. are the most common agents of external skin infection.

Gas gangrene, also called progressive or clostridial myonecrosis, is a type of moist gangrene most commonly caused by an infection of *Clostridium perfringens*, or other species that are capable of thriving under conditions where there is little oxygen. These bacteria produce gases and poisonous toxins as they grow in the tissues. Gas gangrene causes the death of tissue, the destruction of red blood cells, and the damaging of the walls of the blood vessels and parts of the kidneys. Early symptoms include sweating, fear, and

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anxiety. Gas gangrene is a life-threatening condition and should receive prompt medical attention.

Diagnosis

A diagnosis of gangrene will be based on a combination of patient history, a physical examination, blood test results, and other laboratory findings. A physician will look for a history of recent trauma, surgery, **cancer**, or chronic disease. Blood tests will be used to determine whether infection is present and to determine how much the infection has spread. A sample of drainage from a wound or obtained through surgery may be tested to identify the bacteria causing the infection and to aid in determining treatment. In the case of gas gangrene, the gas produced by the bacteria may be detected beneath the skin by pressing into the swollen areas. The crackling sounds of gas bubbles may also be heard in the affected area and the surrounding tissues.

X-ray studies and other imaging techniques, such as computed tomography (CT) scans or magnetic resonance imaging (MRI), may be helpful in making a diagnosis by showing evidence of gas accumulation or muscle tissue death. These techniques, however, are not sufficient alone to provide an accurate diagnosis of gangrene. Precise diagnosis often requires surgical exploration of the wound.

Treatment

Chelation therapy is a treatment that uses an intravenous solution containing the drug ethylenediamine tetra-acetic acid (EDTA), among other substances. In the bloodstream, EDTA binds and removes toxins and plaque formation on arterial walls. It promotes circulation throughout the body, and is reportedly, although not proven, able to reverse the processes leading to gangrene. Early intervention is necessary, however.

Other alternative and complementary treatments are used to treat gangrene. Herbal remedies such as **goldenseal** can be applied topically. **Biofeedback** and hypnosis can increase blood flow. Diabetics receive herbal and **traditional Chinese medicine** remedies and nutritional supplements to help prevent gangrene.

Allopathic treatment

Pain medications and large amounts of intravenous antibiotics are given. Prompt surgical removal of infected and destroyed tissue is required for healing to take place. Gas gangrene is often treated with the antitoxin for clostridium as well. In a number of cases, amputation may have to be used to keep the infection under control.

In hyperbaric oxygen (HBO) therapy the patient is placed in a pressurized chamber and receives 100% pure oxygen to breathe. This has been shown useful in inhibiting the production of toxins in gas gangrene and for getting oxygen quickly to tissues, especially following a crushing injury that might lead to gangrene. HBO therapy must be carried out early in the process and used before any surgical removal. The therapy, though useful, does have adverse side effects. It requires skilled technicians and may not be widely available.

Expected results

The outcomes for gangrene are generally favorable if the infection is recognized and treated early in the progression of the disease. Left untreated, gas gangrene will result in a decrease in blood pressure, kidney failure, and coma. Overall, about 20% of those infected with gas gangrene die from the disease, and another 20% require an amputation. Gangrene is most dangerous to the elderly, those who are immuno-compromised, and those who have internal **infections** and chronic conditions such as diabetes. Individuals suffering from dry gangrene often have multiple health problems that complicate recovery and may prove fatal.

Prevention

Infections and injuries should be thoroughly cleaned and monitored; medical attention should be pursued if symptoms worsen or remain unresolved. Gastrointestinal wounds should be surgically explored, drained, and repaired. Use of antibiotic therapy prior to and directly following surgery has been shown to reduce the rates of infection.

Patients with diabetes or severe arteriosclerosis should take particular care of their hands and feet to avoid the decreased circulation and unchecked infection that may lead to gangrene. Any injury or infection, however slight, should be cared for promptly. There should be a focus on proper foot care, including keeping the feet clean, dry, and warm, wearing well-fitting shoes and not going barefoot. It is important to avoid **smoking**, since tobacco use constricts the blood vessels of the hands and feet, decreasing circulation.

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Patience Paradox

Ganoderma

Description

Ganoderma is the name of the fungus *Ganoderma lucidum*. It is also called the **reishi mushroom** or in Chinese *ling zhi*. It is one of the most popular medicinal mushrooms in China, Japan, and the United States.

Ganoderma grows on logs and tree stumps. It has a shiny, hard, asymmetrical cap that ranges in color from yellow to black. The cap, spores, and mycelium are all used medicinally. Wild ganoderma is rare in Asia.

In ancient China, ganoderma was so rare and so highly prized that it was reserved for the emperors and called the "elixir of life." In 1972, Japanese researchers successfully cultivated the mushroom. There are six different colors of cap: red, green, white, black, yellow, and purple. These researchers showed that all colors are the same species and that the color variations are the result of differences in environmental conditions. Despite this information, some herbalists insist that certain colors of reishi mushroom are more potent or effective in healing certain conditions than others.

General use

Ganoderma is considered one of the most important herbs in Asian healing. Its use extends to almost every system of the body. Not only is it believed to heal physical ailments, it is said to bring about a peaceful state of mind and to increase spiritual potency for Taoists and other Asian spiritual seekers.

Ganoderma has been used in China for over 4,000 years. It is the primary shen tonic in Chinese herbalism. In a broad sense, it is used to help a person adapt both physically and mentally to the world. It is used to strengthen and calm the nerves, improve memory, and prevent or delay senility.

***Ganoderma persum* growing on a tree trunk.** *(©David Chapman / Alamy)*

Herbalists consider ganoderma an adaptogen, or natural regulator, suppressing the immune system if it is overactive and boosting it if it is underactive. Many health claims are made on the effect that ganoderma has on the immune system. These claims are based primarily on the presence of high molecular weight polysaccharides and free radical **antioxidants** in ganoderma extracts. Ganoderma also contains the elements **potassium** (K), **magnesium** (Mg), **calcium** (Ca), and germanium (Ge).

Ganoderma is used in Japan and China to treat **cancer** and to stimulate the immune system after radiation or chemotherapy. It is also used to treat myasthenia gravis and **systemic lupus erythematosus** (SLE), both autoimmune diseases. In Japan and China, ganoderma is also used to treat symptoms of viral diseases such as colds, **influenza**, **canker sores**, and **hepatitis**.

Several research studies on ganoderma extracts have been done at universities in Japan, China, and South Korea. Many of these are test-tube or animal

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Ganoderma mushroom. *(The Herald, Stephanie S. Cordle / AP Photo)*

studies. The results are not clear-cut, but they seem to indicate that at least in these non-human systems, ganoderma has an effect on the immune system, some anti-tumor properties, and some anti-viral activity.

Subsequent research in Asian universities investigated the effects of ganoderma on human cells or tissues. One study done in Taiwan indicated that ganoderma inhibits apoptosis (cell self-destruction) in human white blood cells. This finding may help to explain ganoderma's beneficial effects on the immune system.

Ganoderma attracted the attention of Western cancer researchers when a case study report from Columbia University indicated that a Japanese dietary supplement containing ganoderma as well as genistein, a soybean derivative, appeared to be useful in the prevention and treatment of **prostate cancer**. Beginning in the mid 2000s, the National Center for Complementary and Alternative Medicine, funded by the United Sates government, began giving grants to researchers to investigate some of the health claims made for ganoderma. Early results suggested that the herb has some antitumor and antiviral properties.

In Eastern medicine, ganoderma is also used in treating conditions of the nervous system. It is used to calm the nerves, cure **insomnia**, reduce **stress**, eliminate nervous exhaustion, and increase determination and focus. Laboratory studies show fairly conclusively that ganoderma does act as a sedative on cells of the central nervous system and possibly has painkilling and anti-convulsive properties.

Ganoderma is frequently used to treat **allergies**, **hay fever**, bronchial **asthma**, and to reduce skin inflammation. Laboratory studies support these uses and show that some components of ganoderma have a strong antihistamine effect that interrupts the development of allergic reactions.

Many conditions of the blood and circulatory system are treated with ganoderma. These include:

- altitude sickness
- atherosclerosis
- cardiac arrhythmia
- coronary heart disease
- high blood pressure

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KEY TERMS

Adaptogen—A substance that regulates, either by stimulating or suppressing, a system to bring it back within its normal, healthy range.

Apoptosis—A type of programmed cell death in which a damaged cell shuts down and, in effect, commits suicide. Ganoderma appears to inhibit apoptosis in human white blood cells.

Atherosclerosis—A disease in which deposits of fatty materials build up on the walls of arterial blood vessels, causing them to narrow or become obstructed. Blood pressure increases, leading to heart disease.

Myasthenia gravis—A muscle weakness that occurs because the body makes antibodies to the natural chemical that facilitates transmission of impulses between the nerve and the muscle.

Mycelium—The part of the fungus that grows into the log and supports the fruiting body or cap. It is analogous to the roots of a plant.

Reishi mushroom—Another name for ganoderma.

Shen—One of the five body energies. It influences mental, spiritual, and creative energy. Shen tonics address deficiencies in this type of energy.

Spores—Fine powder-like reproductive bodies of the mushroom.

Systemic lupus erythematosus (SLE)—A multi-symptom disease caused by failure of the immune system to regulate itself.

- high blood sugar
- high cholesterol
- low blood pressure
- stroke

Scientific research shows that compounds found in ganoderma do lower blood sugar and interfere with the clotting of blood platelets. This reduction in clotting may account for ganoderma's effectiveness against **stroke** and **atherosclerosis**.

Ganoderma is also used to treat a variety of other diseases. These uses are generally backed by little or no scientific evidence. They include:

- gastroenteritis
- diarrhea
- constipation
- gallstones
- ulcer
- acne
- hair loss
- inflammation of the kidneys
- menstrual cramps
- erectile dysfunction
- low sex drive

Preparations

Virtually all ganoderma available commercially come from cultivated mushrooms. Different preparations are made using the cap, the spores, and the mycelium. These preparations are available in the form of fresh and dried whole mushrooms, capsules, concentrated drips, extracts, tablets, tea bags, tea granules, and tinctures. A common dose is 1,800–2,400 mg in capsule form per day. However, doses vary hugely depending on the condition being treated and the strength and part of the mushroom being used.

Precautions

Although no toxic reactions to ganoderma have been reported, people with allergies to other mushrooms may also experience allergic reactions to ganoderma.

Side effects

Large doses (2–9 g) of ganoderma taken regularly over the course of 3–6 months may result in **diarrhea**, upset stomach, and **dizziness**. **Nosebleeds** from high doses of ganoderma have also been reported. Some herbalists claim that large doses of **vitamin C** taken with this herb will control the symptoms of diarrhea.

Interactions

Ganoderma and other Chinese herbs are often used together with no reported interactions; in fact, a new health food supplement is made from reishi mushrooms grown on herbs, in the belief that the mushrooms absorb some of the properties of the herbs on which they are grown.

With regard to Western pharmaceuticals, ganoderma has been reported to produce negative interactions with warfarin, a blood-thinning medication. Because ganoderma extract may cause a drop in blood pressure, persons who are taking prescription antihypertensives (medications to lower blood pressure) should use ganoderma only if they are being monitored by a physician.

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ORGANIZATIONS

Alternative Medicine Foundation, PO Box 60016, Potomac, MD, 20859, (301) 340-1960, http://www.amfoundation.org.

American Association of Oriental Medicine, PO Box 162340, Sacramento, CA, 95816, (866) 455-7999, (914) 443-4770, http://www.aaaomonline.org.

Centre for International Ethnomedicinal Education and Research (CIEER), http://www.cieer.org.

National Center for Complementary and Alternative Medicine Clearinghouse, PO Box 7923, Gaithersburg, MD, 20898, (888) 644-6226, (866) 464-3615, http://nccam.nih.gov.

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Garcinia

Description

Garcinia is a plant genus native to much of Asia and Australia. Although there are many members of the genus, the species *Garcinia cambogia*, also known as *Garcinia gummi-gutta*, is the best known. This species has also been known as *Garcinia hanburyi* and by the common names Cambogia and Gamboge. The plant, which is native to the Indian subcontinent, has a long medicinal use and, at various times, has been included in the *United States Pharmacopoeia, United States National Formulary*, and the *British Pharmacopoeia*. As of 2008, garcinia was the source of two compounds of medicinal interest, one for weight reduction and the other for **cancer** therapy.

Traditionally, the gum resin of the plant has been used and has been called *Gutta gamba, Gummigutta, Tom Rong, Gambodia* and *Garcinia Morella*.

General use

Historical use

At the start of the twentieth century gamboge was used as a laxative, for treatment of congestive heart failure, and to lower blood pressure in cases of enlargement of the pelvic veins in women, which may be a cause of **dysmenorrhea**. By mid-century, it was no longer used for cardiovascular purposes, but it was still used as a powerful laxative and for the elimination of intestinal **worms**. By the 1950s, gamboge was still recognized medicinally, but only as an ingredient in compound mild mercurous chloride pills, which themselves were essentially obsolete.

Weight reduction

The active component of garcinia that may be beneficial in weight reduction programs is hydroxycitric acid, which is found in the rind and pulp of the fruit. There have been small studies indicating that hydroxycitric acid may influence fat utilization and creation of new fat cells; however, these studies were not definitive.

A 2003 study compared the effects of hydroxycitric acid against a placebo in men during **exercise** over a 5-day period. The authors concluded that the supplement increased fat oxidation, an indication of increased fat utilization. A team from Maastricht University in the Netherlands compared the effects of hydroxycitric acid with a placebo during periods of overeating and concluded that the hydroxycitric acid inhibited the creation of new fat cells.

A significant study was conducted at Georgetown University and involved 60 volunteer subjects who were given a controlled diet and hydroxycitric acid supplements. The authors reported: "At the end of 8 weeks, body weight and BMI decreased by 5.4% and 5.2%, respectively. Food intake, total **cholesterol**, LDL, triglycerides, and serum leptin levels were significantly reduced, while HDL and serotonin levels and excretion of urinary fat metabolites (a biomarker of fat oxidation) significantly increased. No significant adverse effects were reported. These results demonstrate the safety, bioavailability and efficacy of HCA-SX in weight management."

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Flowering garcinia tree. *(Dr. Carleton Ray / Photo Researchers, Inc.)*

Other studies have shown little or no efficacy or have only shown evidence of efficacy when the material was used in conjunction with **caffeine** or other dietary supplements. A study at Purdue University showed no benefit in terms of caloric restriction, while a Creighton University study failed to confirm claims that garcinia preparations increased fat oxidation or metabolic rate. An excellent review of weight loss preparations that appeared in *American Family Physician* in 2004 concluded that there are significant questions about the safety, efficacy, and product quality of supplements containing either garcinia or hydroxycitric acid. The authors recommended that persons using these supplements should be followed carefully, both because of the risk of toxicity and for gaining information regarding whether the preparations are effective or ineffective.

Claims of efficacy for garcinia and hydroxycitric acid may depend on other aspects of the diet. It has been suggested that a high fiber diet, which is recommended by most clinicians, will inhibit the absorption and efficacy of hydroxycitric acid. The reasons for success or failure in clinical studies were not resolved as of 2008.

Cancer therapy

Garcinia has been studied as a possible treatment or preventative for various types of cancer. Although there have been no well documented clinical trials of garcinia in cancer, initial laboratory studies were promising. A study from the Jiangsu Key Laboratory of Carcinogenesis and Intervention reported that gambogic acid, the major active principal of gamboge, inhibits the formation of blood vessels required to support the growth of solid tumors. Another study, from the University of Texas, reported that gambogic acid promotes apoptosis, programmed cell death. This cell death is a normal biological phenomenon, but it is inhibited in cancerous growths permitting the excessive growth of malignant tumors. Laboratory studies have reported on use of garcinia compounds in breast, liver, and gastrointestinal cancers, indicating that the compounds are good candidates for clinical trials.

Preparations

There are no standardized preparations of garcinia. Garcinia extracts, powdered preparations, or hydroxycitric acid have been included in many commercial

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KEY TERMS

Apoptosis—Programmed cell death, the death of individual cells.

Carcinogenesis—Production of cancer.

Congestive heart failure—A condition in which the heart is too weak to maintain an adequate supply of blood to the tissues of the body.

Dysmenorrhea—Painful menstruation.

Fiber—Nutrients in the diet that are not digested by the enzymes in the stomach and/or intestine.

Malignant—Meaning cancerous and tending to spread to surrounding tissues.

Oxidation—Combining with oxygen. In fatty acids, is the process is accomplished with the breakdown of the carbon chain in two-carbon segments.

weight loss preparations, but there are no established dose levels, and no purity rubrics for the natural product.

Precautions

Laboratory studies seem to show that both garcinia and hydroxycitric acid are safe in normal doses. The traditional gamboge of medicine fell into disuse because of severe intestinal griping, which was occasionally fatal, but this was in doses far higher than seen in modern products. Consumption of the fruit of garcinia as part of the diet has been linked to formation of gallstones. While severe adverse effects have been associated with weight loss products containing either garcinia or hydroxycitric acid, these were combination products, and the cause of the adverse effects may have been due to some other component.

Safety of hydroxycitric acid may also depend on the formulation used. It has been suggested that salts of hyroxycitric acid have a high margin of safety, including **sodium**, **potassium**, and **calcium** compounds. The free acid and organic salts of hydroxycitric acid may be more prone to adverse effects.

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Sam Uretsky, PharmD

Garden mint *see* **Spearmint**

Gardenia

Description

Gardenias are members of the madder, or Rubiaceae, family. Though not native to either North or South America, they were named for an eighteenth-century American physician and naturalist, Alexander Garden. Gardenias were originally found only in China and Japan, but today there are over 200 different species of gardenia, mostly hybrid, in existence throughout the world. Gardenias are most prevalent in China, Japan, tropical regions of Southeast Asia and the Pacific islands, and South Africa. With proper conditions, gardenias grow into shrub-like bushes or small trees that can reach 5 ft (1.5 m) in height.

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Most species of gardenia, however, are very tender plants that require an average temperature of at least 60°F (28.9°C), sunlight with some protection, and just the right amount of humidity. They often survive far better in greenhouses than outside. Gardenias are often rambling plants that form mounds of glossy dark green foliage. The leaves are oval in shape and very shiny. The flowers vary in color from pale yellow with purple markings to creamy white, and they have a classic, heavy, sweet scent reminiscent of green apple. All gardenia blossoms have an almost wax-like appearance and can be either single or double, depending on the species. Most gardenias flower in the winter or early spring, and the blossom is followed by the appearance of a large, yellowish-red, bitter-tasting berry that contains a crystalline compound called acrocetin.

The most commonly listed botanical species of gardenia include:

- *Gardenia jasminoides*. This species is easily the most common of these rare, fragile plants. It reaches heights of 2 ft (61 cm) and grows into a tall bushy green shrub that produces white, highly fragrant flowers. *G. jasminoides* is a native of China, and the gardenia most commonly used in Chinese herbal medicine. Its name comes from the fact that it was first introduced to the Western world from Cape Colony in Africa, and the aroma of its large white flowers was said to be very like the scent of jasmine.
- *Gardenia jasminoides fortunata*. This plant is a hybrid version of *G. jasminoides* that is somewhat more hardy.
- *Gardenia nitida*. This gardenia is a slightly taller plant that grows up to 3 ft (93 cm) tall and also produces white blossoms.
- *Gardenia radicans floreplena*. This plant is a low spreading dwarf variety from Japan that grows only to heights of 18 in (46 cm), and has double-blossomed flowers.
- *Gardenia thunbergia*. This gardenia grows to 4 ft (1.2 m) tall, and is often cultivated in American greenhouses. It is found as both tree and shrub, and has white flowers with long tube-like necks.
- *Gardenia rothmania*. This plant is also a particular favorite of American botanists, but does not survive well in North America outside of a greenhouse. It also exists as both tree and shrub, and has pale yellow flowers with short, tube-like necks and purple markings.

KEY TERMS

Astringent—Any substance or medication that causes soft tissue to contract or constrict. Some types of gardenia have astringent properties.

Cold-deficiency diarrhea—In Chinese herbal medicine, this condition is described as cold settling in the abdomen when resistance is low, causing cramping, some gas, and loose, watery stools without any burning sensations.

Expectorant—A substance or medication that promotes the coughing up of phlegm.

Hematuria—A condition in which red blood cells are present in the urine. Blood in the urine may be readily visible or small amounts may give the urine a smoky appearance.

Hemostatic—A drug or medication that stops bleeding. Gardenia is used as a hemostatic agent in traditional Chinese medicine.

General use

Gardenias are widely used as exotic ornamental flowers in corsages, as houseplants, and in some regions, as outdoor plants. A yellow silk dye has been made for centuries from the chemical compound acrocetin extracted from the gardenia berry.

Chinese herbal medicine makes the most extensive use of the gardenia. Its Chinese name is *zhi zi*. The traditional medicinal actions attributed to gardenia include calming irritability; cooling blood and clearing away heat (a yin/yang imbalance often characterized by deficient yin); reducing swelling; and moving stagnant blood that has congealed in one place, usually following trauma. Gardenia is considered to be very effective as a hemostatic agent, which means that it stops bleeding; and also effective in treating injuries to the muscles, joints, and tendons. Gardenia is commonly used in Chinese herbal formulas to treat **infections**, particularly bladder infections; abscesses; **jaundice**; and blood in the urine, sputum, or stool. Because of its perceived ability to ease agitation or irritability, it is also used in formulas to treat **anxiety** or **insomnia**. It is also helpful in correcting menopausal imbalances reflected in insomnia and **depression**, nervous tension, **headache**, and **dizziness**.

The United States Department of Agriculture Agricultural Research Service phytochemical and ethnobotanical database lists the following species of gardenia as having specific medicinal properties:

- *Gardenia gummifera*. This species can be helpful in treating digestive problems, including dyspepsia and

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diarrhea; or used as an astringent and expectorant for nervous conditions and spasms.

- *Gardenia storckii*. This variety can be used in treating constipation.
- *Gardenia lucida*. This gardenia has antiseptic properties that can kill both bacteria and insects.
- *Gardenia pseudopsidium*. This species has been used to treat smallpox.
- *Gardenia jasminoides*. This gardenia has been found to be helpful in the treatment of pain, nose bleeds, fever, and influenza; in healing wounds and reducing swelling; and in treating mastitis, hepatitis and the hematuria that accompanies bladder infection.
- *Gardenia augusta*. This variety has shown effectiveness in the treatment of headaches, fever, delirium, mastitis, and jaundice related to liver problems.
- *Gardenia campanulata*. This plant is used in healing wounds, burns, and scalds; in reducing swelling; as a treatment for fever and influenza; in treating jaundice associated with liver problems; and in stopping bleeding.
- *Gardenia labifolia*. This gardenia has been found effective in treating the bites of certain snakes.

Preparations

The kernel within the gardenia berry is often removed for use in herbal poultices put on sports injuries such as **sprains**, pulled muscles, or inflammation of nerves. The use of gardenia poultices is particularly common in Chinese medicine. Traditional Chinese practitioners make a paste of the herb with flour and wine. The powdered berry is given in both decoctions and capsules. When gardenia is used to stop bleeding it is usually burned before it is simmered in water.

Precautions

Chinese herbalists state that gardenia should not be used when there is cold deficiency (watery) **diarrhea** present.

It is important to remember that Chinese herbal medicine is based upon individual prescriptions developed for each patient and their unique symptoms. Chinese herbs should not be taken, either individually or in formulas, unless a practitioner of Chinese herbal medicine is first consulted.

Side effects

Gardenia has laxative properties, and can cause loose stools when taken frequently or in large amounts.

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Joan Schonbeck

Garlic

Description

Garlic (*Allium sativa*) is a plant with long, flat grass-like leaves and a papery hood around the flowers. The greenish white or pink flowers are found grouped together at the end of a long stalk. The stalk rises directly from the flower bulb, which is the part of the plant used as food and medicine. The bulb is made up of many smaller bulbs covered with a papery skin known as cloves. Although garlic is known as the "stinking rose" it is actually a member of the lily family.

The most active components of fresh garlic are an amino acid called alliin and an enzyme called allinase. When a clove of garlic is chewed, chopped, bruised, or cut, these compounds mix to form allicin, which is responsible for garlic's strong smell. Allicin, in turn, breaks down into other **sulfur** compounds within a few hours. These compounds have a variety of overlapping healing properties.

Garlic also contains a wide range of trace minerals. These include **copper**, **iron**, **zinc**, **magnesium**, germanium, and **selenium**. The integrity of the growers and suppliers of garlic are important to the integrity of the garlic used. A soil rich with the presence of trace minerals will produce a healthful bulb of garlic, full of those minerals. Depleted soils produce a depleted product. In addition, garlic contains many sulfur compounds, vitamins A and C, and various **amino acids**.

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General use

The ancient Indians, Chinese, Egyptians, Greeks, Romans, and other peoples have used garlic for thousands of years, both as food and as medicine. One of the most famed usages of garlic occurred during the Middle Ages, when garlic was reputed to have been highly effective against the plague.

As early as 1858, Louis Pasteur (1822–1895) formally studied and recorded garlic's antibiotic properties. Dr. Albert Schweitzer (1875–1965) used the herb to successfully treat cholera, typhus, and dysentery in Africa in the 1950s. Before antibiotics were widely available, garlic was used as a treatment for battle **wounds** during both World Wars.

Garlic can be used in the treatment of a variety of bacterial, viral, and **fungal infections**. It has been shown to be effective against staph, strep, *E. coli*, *Salmonella*, Vibrio cholera, *H. pylori*, *Candida albicans*, and other microorganisms. Garlic also helps prevent **heart disease** and strokes. Modern studies show that garlic can improve immune function and may even help in the prevention of **cancer**. To be of benefit in chronic conditions, garlic should be used daily over an extended period of time.

Heart disease

One of the main causes of heart disease is the buildup of plaque on the walls of the blood vessels. This plaque is mostly made up of **cholesterol** and other fatty substances found in the blood. When large amounts of plaque get stuck on artery walls, they block the flow of blood and cause **blood clots** to form. Parts of the artery wall may even be destroyed completely.

In arteriosclerosis, also known as hardening of the arteries, the major arteries may become so stiff and clogged, that the heart cannot get necessary nutrients and oxygen. This condition usually causes a **heart attack**. High serum cholesterol levels are a major risk factor for having a heart attack.

Studies show that people who eat garlic regularly have improved serum cholesterol levels. Some people with high cholesterol have been able to get within normal levels by eating 1–2 cloves per day. In addition, low-density lipoprotein (LDL) and triglyceride levels are decreased and high-density lipoprotein (HDL) levels are increased. This effect correlates with an overall reduced cholesterol level. These benefits are significant in preventing heart disease as well as strokes. While garlic's contribution to reducing levels of harmful plaques has been known for some time, a 2003 study found that garlic also lowered levels of homocysteine, a type of amino acid that in the early 2000s was considered a major risk factor for heart attacks. Manufactured garlic supplements appear to be equally as beneficial as eating fresh cloves. It takes at least one month of using garlic for laboratory results to be seen.

Hypertension

Hypertension, or high blood pressure, is also a significant cause of heart problems. It is one of the leading causes of disability and death due to **stroke**, heart attack, heart failure, and kidney failure. Garlic can help reduce blood pressure through the actions of its sulfur compounds and its ability to reduce the fatty substances, such as cholesterol, found in the bloodstream. Use of garlic also can help normalize low blood pressure.

Platelet aggregation

Platelets clot the blood in order to repair breaks in the blood vessel walls. When there is an injury, platelets are attracted to the damaged area and become attached to the wall and to other platelets. Platelet aggregation, as this process is called, plugs up the break and prevents further blood loss while the injury is being repaired. This is a good and necessary part of healing an injury.

If there are serious problems with the heart and blood vessels and there is too much injury and clotting, the vessels may become clogged with platelets, which can lead to strokes and heart disease. The sulfur compounds in garlic—particularly ajoene—give the platelets a slippery quality. They are less able to clump together, thus slowing down platelet aggregation. Garlic can be used effectively in the same way as a daily dose of aspirin to reduce or prevent platelet aggregation over an extended time.

Cancer

Studies have found that garlic blocks the formation of powerful carcinogens, called nitrosamines, which may be formed during the digestion of food. This may be why in populations in which people consume a large amount of garlic, there is a decreased incidence of all types of cancer. The **antioxidants** found in garlic may also contribute to this effect by protecting against the cell damage by cancer-causing free radicals. Studies show that use of garlic may also inhibit the growth of a variety of tumors. However, cancer-related studies are not conclusive and relate to consumption of raw or cooked garlic, not garlic supplements.

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Infectious conditions

Eating garlic is good for helping the body's immune system resist **infections**. While garlic is not as strong as modern antibiotics, it is believed to kill some **strains** of bacteria that have become resistant to antibiotics. Studies have shown garlic treats yeast infections, and it can kill many of the viruses responsible for colds and flu. While daily consumption of garlic was once highly recommended for HIV-positive individuals, the National Institutes of Health (NIH) reported in 2002 that garlic supplements greatly reduced levels of saquinavir, an HIV protease inhibitor, in patients' blood. The NIH began cautioning patients who used garlic to control cholesterol levels who also used saquinavir or combination therapies, since garlic might interfere with their effectiveness.

Modern doctors, in reconsidering the causes of many diseases, have discovered that bacteria and viruses may be the cause of sicknesses that were formerly not thought to be caused by infections. Included are gastric ulcers, **colitis**, and Kaposi's sarcoma. Garlic may be useful in treating or preventing these due to its antimicrobial properties.

Diabetes

Garlic has the ability to lower and help keep blood sugar stable by helping to increase the amount of insulin available in the bloodstream. This action, together with garlic's ability to lower cholesterol and blood pressure, make it an excellent daily supplement for people with diabetes. A 2003 report showed that long-term use of garlic helped improve the blood vessel systems of diabetic rats.

Cancer

Garlic may also be helpful in reducing the risk for a number of cancers, according to a study by Swiss and Italian researchers published in the November 2006 issue of *American Journal of Clinical Nutrition*. The meta-study looked at a number of previous studies of garlic and onion use among approximately 25,000 people in Italy and Switzerland. In people who ate 15–22 portions of onions and garlic per week, the reduced risk of various types of cancer was: oral and pharynx, 84%, esophageal, 88%, colorectal, 56%, laryngeal, 83%, breast, 25%, ovarian, 73%, prostate, 71%, and kidney, 38%.

Other health conditions

Garlic is effective in the treatment of numerous other conditions. The following list provides some examples:

- The consumption of 1–3 cloves per day is useful for immune support and as a preventive against diseases and infection.
- Warmed garlic oil in the ear canal can be used to treat ear infections.
- Garlic can be used to treat respiratory complaints such as asthma and chronic bronchitis.
- Garlic helps increase the body's ability to handle the digestion of meat and fats.
- Garlic can be used to help kill and expel intestinal worms in both animals and humans.
- When added to a pet's food, garlic helps repel fleas.
- Garlic is helpful in getting rid of athlete's foot.
- Garlic relieves gas and other stomach complaints.
- The sulfur compounds found in garlic can bind to heavy metals and other toxins and help remove them from the body.
- Garlic can be used externally for cuts, wounds, and skin eruptions.
- The taste of garlic in mother's milk stimulates improved nursing. Infants eat more and nurse longer. They appear to relish the taste of slightly garlicky milk. The components of garlic that reach the infant through the mother's milk also may be helpful in relieving colic and infections.

Preparations

Used internally

Garlic can be eaten raw or cooked, taken as tablets or capsules, and used as a tincture or syrup.

The suggested dosage for fresh whole garlic is one to three cloves per day. The cloves can be chewed and held in the mouth or swallowed. Consuming raw garlic can actually be a pleasure if the herb is crushed or grated and mixed with food or a tablespoon of honey. The dosage for tinctures is 2–4 ml or 15–40 drops taken twice daily. One tablespoon of the syrup should be taken three times a day, or as needed to relieve coughing. Garlic oil should be slightly warmed, and 1–3 drops should be put in the affected ear 1–3 times per day.

Tablets and capsules are often more convenient to use than raw garlic, and they are more likely to be tolerated by garlic-sensitive individuals. Garlic pills also minimize the garlic taste and odor. Manufacturers vary on which components of the herb are emphasized.

In general, the following dosages are appropriate, but product labels also should be consulted:

- 400–500 mg of allicin, twice daily

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- a dose equaling approximately 4,000 mcg of allicin potential, once or twice daily
- 400–1,200 mg of dried garlic powder
- 1,000–7,200 mg of aged garlic
- a dose equivalent to 0.03–0.12 ml of garlic oil, three times per day

Manufactured garlic pills come in a variety of forms, and a great deal of controversy continued in the early 2000s about what type is best. Studying the manufacturers' literature and other information is important to make a good decision about which preparation to use. The types of garlic preparations include:

- garlic oil capsules
- encapsulated powdered garlic
- odorless garlic pills
- allicin-stabilized pills
- aged garlic extract

Used externally

The raw cloves can be directly applied externally. A poultice can be made using grated or crushed fresh garlic. The herb material should be placed directly on the site of injury or eruption, either as is or mixed with enough honey to make a paste. The poultice can be held in place with a cloth or bandage.

A compress of garlic is less messy than a poultice and may be less irritating to the site of the injury. It is made by wrapping grated or crushed fresh garlic in a single piece of cheesecloth. As with the poultice, the compress is placed directly on the affected area.

Garlic oil can be made by putting a whole bulb of grated or finely chopped garlic into a pint jar of olive oil, and letting it sit undisturbed in a warm place, away from direct sunlight, for at least two weeks. Then it can be strained and refrigerated. The garlic oil will stay fresh in the refrigerator for up to two years.

A garlic suppository can be used to treat vaginal yeast or mild bacterial infections. A clove of fresh garlic should be peeled and slightly crushed or bruised. If crushed garlic irritates the vaginal tissue, an alternative that might lessen the desired antimicrobial effect is to use the whole, uncrushed garlic clove. The clove should be wrapped in a single layer of cheesecloth and inserted into the vaginal canal overnight for 5–10 days. Dental floss or a length of the cheesecloth can be used to make the suppository easier to retrieve. If the garlic causes a burning sensation, this can be eased with the insertion of plain yogurt into the vagina.

KEY TERMS

Anticoagulant—Any substance that reduces or prevents the blood's tendency to clot in order to prevent blockages in the arteries.

Antimicrobial—Having the ability to help the immune system resist or destroy a wide spectrum of disease-causing organisms.

Carcinogens—Chemical substances that cause cell mutations and, ultimately, cancer.

Cholesterol—A fatty substance found only in animals; used in the body to build cell walls and in the forming of bile and sex hormones.

Free radicals—Highly reactive toxins in the body that can bind to cells and damage them. Antioxidants are useful in neutralizing these compounds.

HDL—Beneficial lipoprotein molecules that transport cholesterol to the liver to be processed and excreted, thereby lowering cholesterol levels. Also known as good cholesterol.

LDL—Lipoproteins that transport cholesterol to body tissues for storage and thereby raise cholesterol levels. Also known as bad cholesterol.

Plaque—A buildup of fats, cholesterol, calcium, and fibrous tissue in the blood that tends to attach to and weaken artery walls.

Stroke—A condition caused by the blockage of blood flow and oxygen to the brain. Paralysis, coma, and death may result.

Suppository—Any treatment prepared to be inserted into the vagina or the rectum.

Precautions

Consumers will find a wide variety of garlic preparations on the market. Therefore, it is important to study manufacturers' claims, talk to knowledgeable practitioners, and find out which formulations are most effective for a given condition.

Due to the high concentration of sulfur compounds in garlic, it should be avoided by those allergic to sulfur. Garlic inhibits clotting, thereby causing increased bleeding times. Hemophiliacs and those on anticoagulant medication should consult a physician before taking garlic on a daily basis. This caution also applies to individuals who are preparing to undergo surgery. Medicinal use of garlic should be discontinued for at least 1–2 weeks before surgery. HIV patients receiving protease inhibitor or combination therapy

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should check with their physicians before using garlic supplements, as garlic may interfere with the therapy's effectiveness.

Side effects

Raw garlic can be very irritating to the digestive system. Excessive intake (usually, more than three or four cloves a day) can cause bloating, **gas**, cramping, **diarrhea**, and may even damage the red blood cells. When applied to the skin, garlic may cause **itching**, redness, and swelling. Garlic that is cooked, aged, or made into pills is not nearly as harsh on the system. However, these forms may not be as suitable as raw garlic in treating some conditions, particularly infections.

Garlic travels through the lungs and the bloodstream, giving a pungent garlic odor to the breath, skin, and perspiration. The odor will be present for at least 4–18 hours, sometimes even when so-called odorless garlic pills are used.

Interactions

Garlic does well when combined with **coltsfoot** or **lobelia** for treating **asthma** and **bronchitis**. Although onion is not as potent as garlic, it has similar actions, and the two often are combined. Use of garlic is contraindicated in individuals using the anticoagulant drug warfarin or certain HIV therapies.

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American Association of Acupuncture and Oriental Medicine, PO Box 162340, Sacramento, CA, 95816, (866) 455-7999.

American Institute of Homeopathy, 801 N. Fairfax St., Suite 306, Alexandria, VA, 22314, (888) 445-9988.

Australian Homeopathic Association, 6 Cavan Ave., Renown Park, SA, 5008, Australia, (61) 8-8346-3961, http://www.homeopathyoz.org.

Homeopathic Medical Council of Canada, 3910 Bathurst St., Suite 202, Toronto, ON, M3H 3N8, Canada, (416) 638-4622, http://www.hmcc.ca.

National Center for Alternative and Complementary Medicine, 9000 Rockville Pike, Bethesda, MD, 20892, (888) 644-6226, http://www.nccam.nih.gov.

Patience Paradox
Ken R. Wells

Gas

Definition

Gas, or flatus, is the by-product of the breakdown of food by naturally occurring bacteria in the gastrointestinal tract. Gas can also enter the digestive system when an excess of air is swallowed. The body absorbs some of this air, but the rest is expelled as gas. Gastrointestinal gases include methane, carbon dioxide, nitrogen, and hydrogen.

Description

Gas production is an essential, normal function of the gastrointestinal tract, and most healthy individuals pass up to 1,200 cc (over 40 oz) of gas each day. The odor associated with gas comes from small amounts of **sulfur** released by bacteria. When gas causes excessive **pain** and cramping (**colic**), evaluation and treatment are appropriate.

Causes and symptoms

Gastrointestinal gas production can be increased by certain foods, illnesses, and some medications. Common causes of excessive gas include:

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Common remedies for gas

Remedy	Description
Acupressure	Press inward at the point three finger widths below the navel known as Conception Vessel 6.
Exercise	Exercise after meals and regularly to increase digestion and expel gas.
Herbal medicine	Anise water, peppermint or chamomile tea, and fennel may relieve gas.
Homeopathy	Carbo vegetabilis (or vegetable charcoal) is used to relieve gas. Nux vomica is used to treat gas that accompanies constipation. Chamomilla is used to treat gas in infants.
Diet	Increase fiber intake. Do not mix carbohydrates with proteins at the same meal. Avoid beans, peas, cheese, sodas, and alcohol. Do not overeat. Chew food well and eat slowly.
Hydrotherapy	Alternate a warm compress with a vigorous cold friction rub on the abdomen.
Yoga	The Boat, Bow, Cobra, and Pigeon positions all encourage digestion and help relieve gas pain.

(Illustration by Corey Light. Cengage Learning, Gale)

- Gas-producing foods. Onions, beans, the vegetables in the cabbage family, and other fibrous foods can cause excessive gas or intestinal spasms in some individuals. High fat intake also reduces the body's ability to digest carbohydrates and may lead to larger amounts of gas.
- Gastrointestinal diseases and disorders. Increased flatulence is a defining symptom of irritable bowel syndrome, diverticulitis, lactose intolerance, malabsorption problems, dysbiosis (imbalance among the various types of bacteria in the gut), and other gastrointestinal disorders.
- Air swallowing (aerophagia). Swallowing too much air while eating or chewing gum can introduce extra gas to the gastrointestinal tract.
- Medications. Certain prescription and over-the-counter medications may cause gas as a side-effect.
- Stress and food allergies can also cause gas.

Symptoms of excessive gas production include:

- flatulence
- belching or burping
- abdominal cramping or colic
- abdominal pain

Diagnosis

A thorough medical and dietary history and physical examination performed by a healthcare professional can usually identify the cause of gas pains caused by diet or medication. Gas problems triggered by gastrointestinal disease may be harder to diagnose and will typically require additional medical testing such as colonoscopy or an upper and/or lower gastrointestinal (GI) series (x rays of the digestive system).

Treatment

Changes in diet can eliminate most excessive gas caused by a particular food or beverage, reducing the amount of fat in the diet, and eating smaller, more frequent meals. Gas caused by air swallowing can be alleviated by eating more slowly, and avoiding **smoking**, gum chewing, and drinking through a straw.

An herbalist or naturopathic healthcare professional may recommend a preparation of carminative (gas reducing) herbs such as **valerian** (*Valeriana officinalis*) or **peppermint** (*Mentha piperita*). These may be helpful in eliminating discomfort and gas-related bloating.

Homeopathic remedies for excessive intestinal gas include Carbo vegetabilis, Nux vomica, and Chamomilla. The prescription of a specific homeopathic remedy will depend on an individual's overall symptom picture, mood, and temperament, and should be prescribed by a qualified homeopathic physician.

Hydrotherapy, **acupressure**, **acupuncture**, **yoga**, **reflexology**, and mild **exercise** can also help to relieve the pain and discomfort of excessive gas.

Allopathic treatment

Over-the-counter preparations of the enzyme alpha-D-galactosidase (e.g., Beano) can alleviate gas symptoms caused by ingestion of certain foods in some individuals. These preparations are typically

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KEY TERMS

Homeopathic—Healthcare practice that uses remedies and treatments that cause similar effects to the symptoms they are intended to treat in an effort to stimulate the natural immune response of the body.

Malabsorption problems—A condition in which the intestinal tract is not able to absorb adequate nutrients from the food that passes through it (e.g., celiac disease, inflammatory bowel disease).

available in liquid or tablet form. Other non-prescription medications such as Gas-X, Phazyme, and Mylanta contain the ingredient simethicone that can reduce gas bubbles within the gastrointestinal tract. Lactase enzyme supplements help some people digest lactose (milk sugar) without producing gas.

Expected results

Mild excess gas is typically easy to treat, especially when triggered by dietary causes. Gas caused by gastrointestinal disease may be more difficult to manage, and successful treatment depends on the type and severity of the disorder.

Prevention

Avoiding fermented foods, drastic increases in fiber intake, and excessive air intake can prevent gas in some individuals. Lactose intolerant individuals should avoid dairy products.

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Alternative Medicine Foundation, PO Box 60016, Potomac, MD, 20859, (301) 340-1960, http://www.amfoundation.org.

American Holistic Medical Association, PO Box 2016, Edmonds, WA, 98020, (425) 967-0737, http://www.holisticmedicine.org.

American Institute of Homeopathy, 801 N. Fairfax St., Suite 306, Alexandria, VA, 22314, (888) 445-9988, http://homeopathyusa.org.

National Digestive Diseases Information Clearinghouse (NDDIC), 2 Information Way, Bethesda, MD, 20892-3570, (800) 891-5389, http://digestive.niddk.nih.gov.

Paula Ford-Martin

Gastritis

Definition

Gastritis commonly refers to inflammation of the lining of the stomach, but the term is often used to cover a variety of symptoms resulting from this inflammation, as well as symptoms of burning or discomfort. True gastritis comes in several forms and is diagnosed using a combination of tests. In the 1990s, scientists discovered that the main cause of most gastritis is infection by a bacterium called *Helicobacter pylori*.

Description

Gastritis should not be confused with common symptoms of upper abdominal discomfort. It has been associated with ulcers, particularly peptic ulcers, and in some cases, chronic gastritis can lead to more serious complications.

Nonerosive H. pylori gastritis

Under current theory, the main cause of true gastritis is *H. pylori* infection, which is found in an average of 90% of patients with chronic gastritis. *H. pylori* is a bacterium whose outer layer is resistant to the normal effects of stomach acid in breaking down bacteria. The resistance of *H. pylori* means that the bacterium may remain in the stomach for long periods of times, even years, and eventually cause symptoms of gastritis or ulcers when other factors are introduced, such as the presence of specific genes or the use of nonsteroidal anti-inflammatory drugs (NSAIDs). Studies of the role of *H. pylori* in the development of gastritis and peptic ulcers have disproved the former belief that **stress** leads to most stomach and duodenal ulcers. The newer findings have resulted in improved treatment and reduction of stomach ulcers. *H. pylori* is most likely transmitted between humans, although the

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KEY TERMS

Apigenin—A bioflavonoid contained in chamomile that appears to inhibit *H. pylori*.

Atrophic—Characterized by a wasting away of a part of the body.

Capsaicin—A crystalline, bitter compound found in peppers. It may be helpful in treating some forms of gastritis.

Demulcent—A medication or substance that is used to soothe irritated mucosa. Some of the herbs recommended to treat gastritis have demulcent properties.

Helicobacter pylori—The bacterium that is implicated in most cases of nonerosive gastritis.

NSAIDs—An abbreviation for nonsteroidal anti-inflammatory drugs. Heavy use of NSAIDs is the most common cause of erosive gastritis.

specific routes of transmission still are under study. Studies are also underway to determine the role of *H. pylori* and resulting chronic gastritis in the development of gastric cancers.

Erosive and hemorrhagic gastritis

After *H. pylori*, the second most common cause of chronic gastritis is the use of NSAIDs. These commonly used **pain** killers, including aspirin, fenoprofen, ibuprofen and naproxen, can lead to gastritis and peptic ulcers. Other forms of erosive gastritis are caused by alcohol or corrosive agents, or by injuries to the stomach tissues from the ingestion of foreign bodies.

Other forms of gastritis

Clinicians differ on the classification of the less common and specific forms of gastritis, particularly since there is so much overlap with *H. pylori* in development of chronic gastritis and complications of gastritis. Other types of gastritis that may be diagnosed include:

- Acute stress gastritis. This is the most serious form of gastritis. It usually occurs in critically ill patients, such as those in intensive care. Stress erosions may develop suddenly as a result of severe trauma or stresses on the stomach lining.
- Atrophic gastritis. This form of gastritis results from chronic gastritis. It is characterized by atrophy, or a decrease in size and wasting away of the gastric lining. Gastric atrophy is the final stage of chronic gastritis and may be a precursor of gastric cancer.
- Superficial gastritis. This term is often used to describe the initial stages of chronic gastritis.
- Uncommon specific forms of gastritis include granulomatous, eosiniphilic, and lymphocytic gastritis.

Causes and symptoms

Nonerosive H. pylori gastritis

H. pylori gastritis is caused by infection from the *H. pylori* bacterium. It is believed that most infection occurs in childhood. Clinicians think that there may be more than one route for the bacterium. Its prevalence and distribution differs in nations around the world. The presence of *H. pylori* has been detected in 86–99% of patients with chronic superficial gastritis. Physicians are still learning about the link of *H. pylori* to chronic gastritis and peptic ulcers, since many patients with *H. pylori* infection do not develop symptoms or peptic ulcers. *H. pylori* is also seen in 90–100% of patients with duodenal ulcers.

The symptoms of *H. pylori* gastritis include abdominal pain and reduced acid secretion in the stomach. The majority of patients with *H. pylori* infection have no symptoms, even though the infection may lead to ulcers and resulting symptoms. Ulcer symptoms include dull, gnawing pain, often two to three hours after meals; and pain in the middle of the night when the stomach is empty.

Erosive and hemorrhagic gastritis

The most common cause of this form of gastritis is the use of NSAIDs. Other causes may be **alcoholism** or stress from surgery or critical illness. The role of NSAIDs in development of gastritis and peptic ulcers depends on the dose level. Although even low doses of aspirin or other nonsteroidal anti-inflammatory drugs may cause some gastric upset, low doses generally will not lead to gastritis. However, as many as 10–30% of patients on higher and more frequent doses of NSAIDs, such as those with chronic arthritis, may develop gastric ulcers. Patients with *H. pylori* already present in the stomach who are treated with NSAIDs are much more susceptible to ulcers and other gastrointestinal effects of these pain killers.

Patients with erosive gastritis may also show no symptoms. When symptoms do occur, they may include **anorexia nervosa**, gastric pain, **nausea**, and **vomiting**.

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Other forms of gastritis

Less common forms of gastritis may result from a number of generalized diseases or from complications of chronic gastritis. Any number of mechanisms may cause various less common forms of gastritis and they may differ slightly in their symptoms and clinical signs. However, they all have inflammation of the gastric mucosa in common. Research recently found that severe gastritis may occur rarely as a result of infectious **mononucleosis**.

Diagnosis

Nonerosive H. pylori gastritis

H. pylori gastritis is easily diagnosed through the use of the urea breath test. This test detects active presence of *H. pylori* infection. Other serological tests, which may be readily available in a physician's office, may be used to detect *H. pylori* infection. Newly developed versions offer rapid diagnosis. New stool antigen tests were developed and made available in 2002. The choice of test will depend on cost, availability and the physician's experience, since nearly all of the available tests have an accuracy rate of 90% or better. Endoscopy, or the examination of the stomach area using a hollow tube inserted through the mouth, may be ordered to confirm the diagnosis. A biopsy of the gastric lining also may be ordered.

Erosive or hemorrhagic gastritis

The patient's clinical history may be particularly important in the diagnosis of this type of gastritis, since its cause is most often the result of chronic use of NSAIDs, alcoholism, or abuse of other substances.

Other forms of gastritis

Gastritis that has developed to the stage of duodenal or gastric ulcers usually requires endoscopy for diagnosis. It allows the physician to perform a biopsy for possible malignancy and for *H. pylori*. Sometimes, an upper gastrointestinal x-ray study with barium is ordered. Some diseases such as Zollinger-Ellison syndrome, an ulcer disease of the upper gastrointestinal tract, may show large mucosal folds in the stomach and duodenum on radiographs or in endoscopy. Other tests check for changes in gastric function.

Treatment

Some alternative treatments for gastritis follow mainstream medical practice in distinguishing between gastritis and other digestive disorders; others treat all disorders originating in the stomach in similar fashion.

Dietary supplements

Of all the alternative treatments for gastritis, dietary supplements of various types are the most likely to have been tested in clinical research. Some alternative practitioners have used the following supplements:

- Capsaicin. Capsaicin is the active ingredient in chili peppers. One study in human subjects indicates that capsaicin offers some protection against gastritis caused by aspirin.
- Antioxidants. Vitamin C and beta-carotene given in combination appear to be beneficial to most patients with chronic atrophic gastritis.
- Amino acids. Several studies indicate that cysteine speeds healing in bleeding gastritis related to NSAIDs and in atrophic gastritis. Glutamine appears to protect against the development of stress-related gastritis.
- Vitamins. Preliminary research suggests that large doses of vitamin A may reduce or eliminate erosive gastritis. Vitamin B_{12} is helpful for patients with prenicious anemia related to atrophic gastritis.
- Gamma oryzanol. In one study, 87% of patients with various types of gastritis reported at least some improvement from a daily dose of 300 mg of gamma oryzanol.

Herbal therapy

Herbs that have been recommended for gastritis include:

- Licorice. Licorice is a traditional remedy for stomach inflammation. It also appears to inhibit the growth of *H. pylori*. People who gain water weight or develop high blood pressure as side effects of taking licorice can be treated with licorice that has had the glycyrrhizin removed.
- Goldenseal. This herb contains berberine, a compound with antibiotic properties. There is some evidence that berberine is active against *H. pylori*.
- Chamomile. Chamomile contains apigenin, a bioflavonoid that inhibits *H. pylori*, and chamazulene, a compound that counteracts free radicals.
- Marsh mallow and slippery elm. These herbs have demulcent properties, which means that they soothe irritated mucous membranes.
- Echinacea and geranium. These herbs are recommended by some practitioners for their antiseptic and analgesic (pain-relieving) properties.

Naturopathic practitioners also advise patients with gastritis to eat certain categories of food separately. Patients are advised to eat protein foods by

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themselves or with green leafy vegetables; to eat fruits alone; and to avoid combining proteins and starches.

Acupuncture/acupressure

One source recommends applying gentle pressure to a point on the abdomen known as CV (conception vessel) 12, midway between the navel and the breastbone. Pressure should be applied when the stomach is empty. Trained acupuncturists treat stomach problems by releasing energy from the spleen and from other energy points associated with digestion.

Yoga

The Bow Pose is recommended by some teachers of **yoga** for stomach disorders because it puts pressure on a number of acupoints on the abdomen associated with the digestive process and with the stomach meridian.

Chinese herbal medicine

The Chinese traditionally use a tea made from **ginger** (*Zingiber officinale*) as a stomachic, to improve digestive functions.

Reflexology

A trained reflexologist will gently massage the stomach reflexes located on the hands and feet. On the hands, the stomach reflexes are on the palms, below the pads of the middle and index fingers. On the feet, the stomach reflexes are located on the sole just below the pad of the big toe.

Allopathic treatment

H. pylori gastritis

The discovery of *H. pylori's* role in the development of gastritis and ulcers has led to improved treatment of chronic gastritis. Since the infection can be treated with antibiotics, the bacterium can be completely eliminated up to 90% of the time. The treatment, however, may be uncomfortable for patients and relies heavily on patient compliance. No single antibiotic has been found that would eliminate *H. pylori* on its own, so various combinations of antibiotics have been prescribed to treat the infection.

TRIPLE THERAPY. As of early 1998, triple therapy was the preferred treatment for patients with *H. pylori* gastritis. This treatment regimen usually involves a two-week course of three drugs. An antibiotic such as amoxicillin or tetracycline, and another antibiotic such as clarithromycin or metronidazole are used in combination with bismuth subsalicylate, a substance that helps protect the lining of the stomach from acid. This treatment often fails due to poor patient compliance and quadruple therapy is required.

DUAL THERAPY. Dual therapy involves the use of an antibiotic and a proton pump inhibitor. Proton pump inhibitors help reduce stomach acid by halting the mechanism that pumps acid into the stomach. Dual therapy has not been proven to be as effective as triple therapy, but may be ordered for some patients who can more comfortably handle the use of fewer drugs.

OTHER TREATMENTS. Scientists have experimented with quadruple therapy, which adds an antisecretory drug, or one that suppresses gastric secretion, to the standard triple therapy. One study showed this therapy to be effective with only a week's course of treatment in more than 90% of patients. The goal is to develop the most effective therapy combination that can work in one week of treatment or less.

Treatment of erosive gastritis

Patients with erosive gastritis may be given treatments similar to those for *H. pylori*, especially since some studies have demonstrated a link between *H. pylori* and NSAIDs in causing ulcers. The patient will most likely be advised to avoid NSAIDs.

Other forms of gastritis

Specific treatment will depend on the cause and type of gastritis. These may include prednisone or antibiotics. Critically ill patients at high risk for bleeding may be treated with preventive drugs to reduce the risk of acute stress gastritis. Sometimes surgery is recommended, but is weighed against the possibility of surgical complications or death. Once heavy bleeding occurs in acute stress gastritis, mortality is as high as 60%.

Expected results

The results expected from alternative treatments for gastritis include accelerated healing from some of the dietary therapies, and some symptomatic relief from **acupressure**, yoga, and **reflexology**.

The discovery of *H. pylori* has improved the prognosis for patients with gastritis and ulcers. Since treatment exists to eradicate the infection, recurrence is much less common. The prognosis for patients with acute stress gastritis is much poorer, with a 60% or higher mortality rate among those bleeding heavily. Recent studies have shown that infection with *H. pylori* and resulting gastritis may lead to such

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complications as chronic gastritis or as serious as gastric adenoma, a form of stomach **cancer**.

Prevention

The widespread detection and treatment of *H. pylori* as a preventive measure in gastritis has been discussed but not resolved. Until more is known about the routes through which *H.pylori* is spread, specific prevention recommendations are not available. It was estimated in late 2002 that the organism was present in 80% of middle-aged adults in developing countries and about 20% of those in industrialized countries. Erosive gastritis from NSAIDs can be prevented with cessation of use of these drugs. An education campaign was launched in 1998 to educate patients, particularly an **aging** population of arthritis sufferers, about the risk of developing ulcers from NSAIDs and alternative drugs.

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Gastrodia

Description

Gastrodia is a preparation made from the rhizome or tuber of an orchid, *Gastrodia elata*. It is a member of the Orchidaceae family. *Gastrodia elata* is a native of the Far East; its natural areas of distribution include Tibet, western China, Korea, and Japan. While gastrodia appears in the oldest lists of Chinese medicinal herbs, it was not known to Western herbalists.

Gastrodia is first mentioned in the *Shennong Bencao Jing*, which was compiled around A.D. 100. A later Chinese herbalist named Tao Hong placed gastrodia in the category of superior herbs, which meant that it could be taken for long periods of time, and that it could be used to promote longevity as well as to treat illnesses. It was originally called *chiqian*, which means "red arrow" in Chinese, because its stem is red and arrow-shaped. Later it was named *tian ma*, or "heavenly hemp," which is the name that it still bears in Chinese herbal formularies.

Like other wild orchids, *Gastrodia elata* is rare and has been placed on the list of endangered species. The increasing difficulty of finding wild gastrodia in the 1970s led to an interesting discovery about this plant. Chinese herbalists tried to cultivate gastrodia, but failed until biologists discovered that the plant needs two fungi in order to survive and reproduce. It needs the *Armillaria mellea* mushroom on its tuber in order to grow and mature; and it requires a second fungus called *Mycena osmundicola* to help its seeds to sprout. After this complicated relationship was understood, herbalists were able to grow gastrodia.

Another aspect of this discovery was the finding that most of the medicinal benefits associated with gastrodia are actually produced by the *Armillaria* mushroom. Many growers then decided to cultivate the mushroom by itself without the gastrodia tuber. Some herbalists now use the *Armillaria* mushroom in their preparations instead of wild or cultivated gastrodia.

General use

In the categories of Chinese herbal medicine, gastrodia is classified as having a sweet and slightly warm nature with a neutral taste. Herbalists have traditionally used it to calm the liver and to clear the meridians by invigorating the patient's circulation. In the categories of Western medicine, gastrodia is said to have sedative and analgesic properties. The specific conditions that were treated by gastrodia include migraine headaches, **dizziness** or vertigo due to liver inflammations, convulsions

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caused by heat excess, paralysis, general **fatigue**, numbness in the hands or feet, and **pain** in the joints. More recently, gastrodia has been used to relieve nervous headaches, pain in the trigeminal nerve, nocturnal emissions, difficult breathing, **insomnia** due to **stress**, and **hypertension**.

Chemical analysis of gastrodia indicates that it contains significant amounts of **calcium**, **magnesium**, and **potassium**. Its active ingredients include gastrodioside, vanillin (from the rhizome), and vanillyl alcohol (from the tuber). These last two compounds are related to vanilla flavoring, which comes from another orchid called *Vanilla plantifolia*. Research indicates that vanillin has anticonvulsive properties. Other research suggests that the gastrodia tuber has analgesic and sedative effects because the compounds in it decrease the level of dopamine in the brain. Studies have shown that gastrodia reduces epileptic seizures, and suggested that is has a protective effect against neuronal damage and may improve the ability of learning memory. A study in 2007 provided insight into the mechanism of gastrodia's anticonvulsive effects. In addition, a 2006 review of the scientific literature on gastrodia noted that various human and animal studies have reported that it affects smooth muscle tone, protects against oxidative damage in nerve and heart-muscle cells, and may serve as an anticoagulant. One study in 2003 also suggested that gastrodia reduces a certain peptide, called amyloid beta peptide, that is believed to play a role in Alzheimer's disease. Therefore, gastrodia may have implications for the treatment of Alzheimer's disease.

Preparations

Single-herb preparations

Gastrodia preparations are made from the tubers and rhizomes, or underground stems, of the plant. The rhizomes are dug in winter or spring. The bark is then removed and the rhizomes are cleaned and boiled, or steamed and baked. They are soaked in water a second time and sliced. In traditional Chinese herbal medicine, gastrodia is given as a decoction (concentration of herb after boiling down), in doses of 3-10 g per day.

The *Armillaria* mushroom that is necessary for the growth of the gastrodia tuber has been given the Chinese name of *tian ma mihuanjun*. It is more potent than the gastrodia tuber because it is the source of the tuber's active compounds. Although exact comparisons have not yet been determined, most Chinese practitioners use about half the customary dosage of gastrodia when they are replacing it with *Armillaria*. The mushroom or the gastrodia tuber are given in powdered form, in doses of 1.0-1.5 g, two or three times per day.

Herbal formulas

Gastrodia has been a favorite herb to use in combination formulas to treat specific conditions. Most of these formulas come in the form of tablets or capsules. A Chinese pharmacology textbook lists the following herbal mixtures containing gastrodia:

- For dizziness and headache caused by a hyperactive liver: gastrodia combined with uncaria and haliotis.
- For disturbances caused by wind-phlegm: gastrodia with pinellia and atractylodes.
- For migraine: gastrodia combined with cnidium.
- For convulsions caused by liver heat: gastrodia with antelope horn and uncaria.
- To clear the meridians and relieve pain or numbness in the limbs: gastrodia combined with achyranthes, *chin-chiu*, and *chiang-huo*.

KEY TERMS

Analgesic—A substance or medication given to relieve pain.

Meridians—In Chinese medicine, pathways of subtle energy that link and regulate the various structures, organs, and substances in the human body. Gastrodia is recommended to clear the meridians of obstructions caused by dampness and wind.

Rhizome—A root-like underground plant stem, often horizontal in position.

Sedative—A substance or medication given to calm and soothe. In traditional Chinese herbal medicine, gastrodia is used as a sedative to the liver.

Tuber—The thick, fleshy, underground stem of a plant.

Precautions

Gastrodia is considered a mild herb by the Chinese, and therefore generally safe to use. It is best to consult an experienced practitioner of Chinese herbal medicine before using gastrodia either as a single herb or in formulas.

Side effects

One source reports that the side effects of gastrodia include skin **allergies**, **hair loss**, and other allergic reactions.

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Interactions

Because gastrodia has not been used by Western herbalists, its potential interactions with standard pharmaceutical preparations have not been studied.

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Gastroenteritis

Definition

Gastroenteritis is a general term for infection or irritation of the digestive tract, particularly the stomach and intestine. It is frequently referred to as stomach or intestinal flu, although the **influenza** virus does not cause this illness. Major symptoms include **nausea**, **vomiting**, **diarrhea**, and abdominal cramps. **Fever** and overall weakness sometimes accompany these symptoms. Gastroenteritis typically lasts about three days. Adults usually recover without problem, but children, the elderly, and persons with an underlying disease are more vulnerable to complications such as dehydration.

Description

Gastroenteritis is an uncomfortable and inconvenient ailment, but it is rarely life-threatening in the United States and other developed nations. In the United States an estimated 220,000 children younger than age five are hospitalized annually with gastroenteritis symptoms. Of these children, 300 die as a result of severe diarrhea and dehydration. In developing nations, diarrhea-related illnesses are a major source of mortality.

Viral gastroenteritis

Gastroenteritis is usually caused by infection with one of the following viruses: rotavirus, adenovirus, astrovirus, calicivirus, and small round-structured viruses (SRSVs). These viruses are found all over the world and are particularly problematic where sanitation is poor. Typical exposure to these viruses occurs through the fecal-to-oral route, by ingesting food that is contaminated with fecal material or by coming in contact with an infected person's vomit or diarrhea and then inadvertently bringing the contaminant to the mouth. Other routes of transmission are quite likely because exposure to as few as 100 virus particles can cause an infection.

Typically, children are more vulnerable to rotaviruses—the most common cause of acute watery diarrhea. It is estimated that each year rotaviruses cause 800,000 deaths worldwide in children younger than age five. The Centers for Disease Control and Prevention (CDC) estimates that rotavirus results in 55,000 annual hospitalizations in the United States for young children and infants. Adults can be infected with rotaviruses, but these **infections** typically have minimal or no symptoms.

Adenoviruses and astroviruses are minor causes of childhood gastroenteritis, and children may become infected with caliciviruses and SRSVs. Adults experience illness from astroviruses as well, but the major causes of adult viral gastroenteritis are the caliciviruses and SRSVs. The SRSVs are a type of calicivirus and include the Norwalk, Southhampton, and Lonsdale viruses. SRSVs are the most likely to produce vomiting as a major symptom.

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Bacterial gastroenteritis

Bacterial gastroenteritis is frequently a result of poor sanitation, the lack of safe drinking water, or contaminated food—conditions that are common in developing nations. Natural or man-made disasters can worsen underlying sanitation and food-safety problems. In developed nations, modern food production, handling, and distribution systems and methods may expose millions of people to disease-causing bacteria. Common types of bacterial gastroenteritis can be linked to *Salmonella* and *Campylobacter* bacteria. In the United States, *Campylobacter* alone affects more than one million people per year; however, *Escherichia coli* O157 and *Listeria monocytogenes* are creating increased concern in developed nations as of 2008. Cholera and shigella remain two diseases of great concern in developing countries, and research to develop long-term vaccines against them was underway as of 2008.

Causes and symptoms

Gastroenteritis arises from ingestion of viruses, certain bacteria, or parasites. Spoiled food may also cause illness. Certain medications and excessive alcohol can irritate the digestive tract to the point of inducing gastroenteritis. Regardless of the cause, the symptoms of gastroenteritis include diarrhea, nausea, vomiting, abdominal **pain**, and cramps. Patients may also experience bloating, low fever, and overall tiredness. Typically, the symptoms last only two to three days, but some viruses may last up to a week.

A typical bout of gastroenteritis should not require a visit to the doctor. However, medical treatment is essential if symptoms worsen or if there are complications. Infants, young children, the elderly, and persons with underlying disease require special attention in this regard.

Dehydration is the greatest danger presented by gastroenteritis. The loss of fluids through diarrhea and vomiting can upset the body's electrolyte balance, leading to potentially life-threatening problems, such as heart beat abnormalities (arrhythmia). The risk of dehydration increases the longer that symptoms are present. Signs of dehydration include a **dry mouth**, increased or excessive thirst, or scanty urination.

Symptoms that do not clear up within a week may point to an infection or disorder more serious than gastroenteritis. Symptoms of great concern include a fever of 102°F (38.9°C) or above, blood or mucus in the diarrhea, blood in the vomit, and severe abdominal pain or swelling. Persons experiencing these symptoms should seek prompt medical attention.

Diagnosis

The symptoms of gastroenteritis are usually sufficient for identifying the illness. Unless there are complications or there is an outbreak that affects several people, identifying the specific cause of the illness is not a priority. If it is necessary to identify the infectious agent, a stool sample will be collected and analyzed for the presence of viruses, disease-causing (pathogenic) bacteria, or parasites.

Treatment

Gastroenteritis is a self-limiting illness that will resolve by itself. Symptoms of uncomplicated gastroenteritis can be relieved with adjustments in diet, herbal remedies, and **homeopathy**. An infusion of meadowsweet (*Filipendula ulmaria*) may be effective in reducing nausea and stomach acidity. Once the worst symptoms are relieved, **slippery elm** (*Ulmus fulva*) can be used to calm the digestive tract.

The homeopathic remedies *Arsenicum album*, **ipecac**, and ***Nux vomica*** are also believed to relieve the symptoms of gastroenteritis. In Chinese herbal medicine, the patent remedies Po Chai and Pill Curing can be effective for relieving nausea and diarrhea.

Supplementing the bacteria that are beneficial to a person's health (**probiotics**) is recommended during the recovery phase of gastroenteritis. Specifically, live cultures of *Lactobacillus acidophilus* are said to be effective in soothing the digestive tract and returning the intestinal flora to normal. In fact, in 2002, a study found it was reasonably effective in treating children with acute infectious diarrhea. *L. acidophilus* is found in live-culture yogurt and in capsule or powder form at health food stores. **Castor oil** packs applied to the abdomen can reduce inflammation, spasms, and discomfort.

It is important to stay hydrated and nourished during a bout of gastroenteritis. In the absence of dehydration, it should be sufficient to drink generous amounts of nonalcoholic fluids, such as water or juice. **Caffeine** should be avoided, since it increases urine output.

The traditional BRAT diet—bananas, rice, applesauce, and toast—is tolerated by the tender gastrointestinal system, but it is not particularly nutritious. Many, but not all, medical researchers recommend a diet that includes complex carbohydrates (rice, wheat, potatoes, bread, and cereal, for example), lean meats, yogurt, fruit, and vegetables. Milk and other dairy products should not create problems if they are part of the normal diet. Fatty foods or foods with a lot of

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sugar should be avoided. These recommendations are based on clinical experience and controlled trials but are not universally accepted.

Allopathic treatment

Over-the-counter medications such as Pepto Bismol are useful in relieving the symptoms of gastroenteritis. These medications work by altering the intestine's ability to move or secrete spontaneously, by absorbing toxins and water, or by altering intestinal microflora. Some over-the-counter medicines use more than one element to treat symptoms, and this information should be included on the label.

If over-the-counter medications are ineffective, a doctor may prescribe a more powerful anti-diarrheal drug, such as motofen or lomotil. If pathogenic bacteria or parasites are found in the patient's stool sample, medications such as antibiotics will be prescribed.

The physician may prescribe odansetron (Zofran) to treat nausea and vomiting. In a study done at the Children's Memorial Hospital in Chicago, one dose of odansetron helped relieve the symptoms and promoted rehydration.

Minimal to moderate dehydration is treated with oral rehydrating solutions that contain glucose and electrolytes. These solutions are commercially available under names such as Naturalyte, Pedialyte, Infalyte, and Rehydralyte. If vomiting prevents patients from taking a full dose of solution, they may better tolerate fluid taken in small, frequent amounts. Should oral rehydration fail or severe dehydration occur, medical treatment in the form of intravenous (IV) therapy is required. IV therapy can be followed with oral rehydration as the patients' condition improves. Once normal hydration is achieved, patients can return to a regular diet.

Sometimes, a child's dehydration is so severe that it requires hospitalization with IV therapy. However, a study published in 2002 informed pediatricians that often, rapid intravenous rehydration and rapid nasogastric hydration in the emergency department are safe and effective alternatives to hospitalization for many children with viral gastroenteritis. Doing so saves money and spares children the more frightening experience of being in a hospital overnight and the routine laboratory testing they would endure in the hospital setting.

Expected results

Gastroenteritis usually clears up within two to three days and there are no long-term effects. If dehydration occurs, recovery is extended by a few days.

KEY TERMS

Dehydration—A condition in which the body lacks the normal level of fluids, potentially impairing normal body functions.

Electrolyte—An ion, or weakly charged element, that conducts reactions and signals in the body. Examples of electrolytes are sodium and potassium ions.

Glucose—A sugar that serves as the body's primary source of fuel.

Influenza—A virus that affects the respiratory system, causing fever, congestion, muscle aches, and headaches.

Intravenous (IV) therapy—Administration of fluids through the veins.

Microflora—The bacterial population in the intestine.

Pathogenic bacteria—Bacteria that produce illness.

Probiotics—Bacteria that are beneficial to a person's health, either through protecting the body against pathogenic bacteria or assisting in recovery from an illness.

Prevention

Gastroenteritis can be avoided by practicing good hygiene, which includes washing hands thoroughly after using the bathroom or coming in contact with an infected person, using disinfectants to clean areas the infected person has come in contact with, and washing infected linens in hot water. Making sure that food is well-cooked and unspoiled can prevent bacterial gastroenteritis but may not be effective against viral gastroenteritis.

In 2006, the United States Food and Drug Administration (FDA) approved RotaTeq, a vaccine to prevent rotavirus in infants. The vaccine is given by mouth in liquid form. It is a live vaccine and is given in three doses between the ages of six weeks and 32 weeks.

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KEY TERMS

Alkaloid—One of a group of organic compounds which are generally toxic.

Neuralgia—Severe nerve pain.

Phenacetin—A compound formerly used to ease pain or fever, but withdrawn because of its serious side effects.

Rhizome—A horizontal, underground stem that sends out roots.

Gelsemium

Description

Gelsemium sempervirens is also known as yellow jasmine, false jasmine, wild woodbine, and Carolina jasmine. It is a woody, climbing vine with dark leaves and groups of yellow, bell-shaped flowers that bloom in early spring. The flowers are very fragrant. It is native to the coastal areas extending from Virginia to Florida, and in Mexico, and is the state flower of South Carolina.

Gelsemium contains extremely toxic alkaloid components, and is not in current medical use. Even very small doses may prove lethal. It was reportedly discovered in the nineteenth century as a result of mistaken identity for another herb. A sick farmer took it for an attack of "bilious fever," and became quite ill. When the symptoms resolved, he discovered that his prior illness had also disappeared. It came into use as an agent to treat **fever**, spasmodic disorders, and the **pain** of **neuralgia**.

General use

The herb form of gelsemium has historically been used for migraines resulting from excessive cerebral blood flow, severe **wheezing** attacks of **asthma**, **insomnia**, and nerve pain, particularly trigeminal neuralgia. The latter condition is a disorder of the trigeminal nerve, which causes shooting pain in the area of the lips, gums, cheek, chin, and occasionally around the eye. Use of the herb form has not been recommended for some time due to the extremely toxic potential of the alkaloids this plant contains.

Homeopathic remedies incorporating gelsemium have specific indications. As with other homeopathic treatments, they contain infinitesimal amounts of the active ingredient, so that toxicity is highly unlikely. Some of the recommendations for the use of homeopathic gelsemium include **migraine headache**, **anxiety**, chemotherapy support, dental support, **influenza**, **nausea**, and recovery from surgery.

Homeopathic gelsemium is thought to relieve anxiety in the form of apprehension about particular events, as well as generalized anxiety. The 30C formulation is recommended for this purpose, taken as needed up to three or four times daily, for no longer than one week. The 6C formulation may be used two or three times prior to undergoing chemotherapy treatment. Similar dosing is recommended prior to a visit to the dentist.

True influenza is a respiratory ailment, although symptoms also include aches, fever, **chills**, and **headache**. Homeopathic recommendations for gelsemium due to flu symptoms include mild fever, dull headache at the nape of the neck, and **dizziness**. Gelsemium 6C can be used for as long as five days, once every three to four hours, during the illness.

Migraine headaches that are felt primarily in the back of the head or as constrictive pain may be helped by homeopathic preparations of gelsemium. Visual aura and aching of the neck and shoulders may accompany this type of headache. For best results, gelsemium 30C is taken as soon as symptoms begin, every 30 minutes, for up to three doses if needed.

Homeopathic gelsemium is also recommended to support surgical recovery, particularly for those who are quite apprehensive and restless. The 6C formulation may be taken for a few days preceding the surgery, up to four doses per day.

Consult a practitioner of **homeopathy** to determine the best indicated doses and combinations of remedies for a particular health issue.

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Preparations

The dried root, harvested in autumn, is the usable portion of the plant. Gelsemium is currently unavailable in medicinal formulations due to the narrow safety margins and dangerous toxicity.

Precautions

Gelsemium is an extremely toxic herb because of the alkaloid component, related to strychnine, which exists in all parts of the plant. Symptoms can include sweating, nausea, muscular weakness, dilated pupils, lowered temperature, and convulsions. It can excessively depress the nervous system, and can cause death due to respiratory failure. A lethal dose is approximately 2–3 g for an adult, and 500 mg for a child. Ingestion of as little as a single flower has reportedly resulted in the fatality of a child. Accidental ingestion of the plant under any circumstances warrants emergency treatment.

The safety margin of gelsemium is extremely small. It should never be used, especially in children, or in women who are pregnant or lactating. Oral use of preparations from the rhizome or root are also considered unsafe. It is particularly dangerous for people with any sort of **heart disease**.

Side effects

There are no reported side effects, although individual aggravations may occur.

Interactions

The effects of aspirin and phenacetin may be increased by gelsemium.

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Judith Turner

Gelsemium sempervirons see **Gelsemium**

Gem healing *see* **Crystal healing**

Genital herpes

Definition

Genital herpes is a sexually transmitted disease caused by the herpes simplex virus. The disease is characterized by the formation of fluid-filled, painful **blisters** in the genital area.

Description

Genital herpes is a sexually transmitted disease spread by vaginal, anal, and oral contact. The first herpes infection a person has is called a primary infection. It develops about four to seven days after contact with the disease. Once a person has been infected with the herpes virus, it cannot be completely cured. Instead, the virus can lay latent in the sensory nerve ganglia for days, months, or even years between outbreaks. When the virus becomes activated there is a recurrent infection of the skin. An active herpes infection is then obvious because of the sores that develop. However, an active infection may occur without visible sores. Up to 75% of people with herpes may not know they have the infection.

Newborn babies who are infected with herpes virus experience a very severe, and possibly fatal, disease called neonatal herpes. In the United States, one in 3,000–5,000 babies born are infected with herpes virus. Babies usually become infected during passage through the birth canal, but they also can become infected during **pregnancy** if the membranes rupture early.

Causes and symptoms

Genital herpes results from an infection by herpes simplex virus. There are several different kinds of human herpes viruses. Only two of these, herpes simplex type 1 (HSV-1) and type 2 (HSV-2), can cause herpes. HSV-2 is most often responsible for genital **infections**. HSV-1 usually causes oral herpes, but it can also cause genital herpes about 10–30% of the time. While the herpes virus can infect anyone, not everyone shows symptoms. Risk factors include early age at first sexual activity, multiple sexual partners, and a medical history of other sexually transmitted diseases (STDs).

The first symptoms of a primary herpes infection usually occur within two to seven days after contact with an infected person but may take up to two weeks. Symptoms of a primary infection are usually more severe than those of recurrent infections. For up to 70% of people, a primary infection causes general

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symptoms such as tiredness, **headache**, **fever**, **chills**, muscle aches, loss of appetite, and painful, swollen lymph nodes. These symptoms are greatest during the first three to four days of the infection and disappear within a week.

Most people with genital herpes experience prodromes, or symptoms of the oncoming disease. Such symptoms might include **pain**, burning, **itching**, or tingling at the site on the genital area, legs, or buttocks where blisters will form. The prodrome stage may occur anywhere from a few hours, to one or two days before an outbreak of the infection. Following that time, small red bumps appear. These bumps quickly become fluid-filled blisters that may also fill with pus and become covered with a scab. The blisters may burst and become painful sores. Blisters may continue to erupt for a week or longer. Pain usually subsides within two weeks, and the blisters and sores heal without scarring by three to four weeks. It is possible to pass the virus to other parts of the body by touching an open sore and then bringing the fingers into contact with the mouth, the eyes, or a break in the skin. The highest risk for spreading the herpes virus is the time during the appearance of blisters up to the formation of scabs. However, an infected person can spread herpes virus to other people even in the absence of sores.

Women can experience a very severe and painful primary herpes infection. In addition to the vaginal area, blisters often appear on the clitoris, at the urinary opening, in the rectum and around the anus, and on the buttocks and thighs. The cervix is almost always involved, causing a watery discharge. About one in 10 women get a vaginal **yeast infection** as a complication of herpes. In men, the herpes blisters usually form on the penis but can also appear on the scrotum, thighs, around the anus, and in the rectum. Men may also have a urinary discharge with a genital herpes infection. Both men and women may experience painful or difficult urination, swelling of the urethra, **meningitis**, and throat infections, with women experiencing these symptoms more often than men.

As of 2008, scientists did not know the factors that trigger a latent herpes virus to activate, but several conditions seem to be connected with the onset of an active infection. These include illness, **stress**, tiredness, sunlight, **menstruation**, skin damage, food **allergies**, and extreme hot or cold temperatures. Most people with genital herpes experience one or more outbreaks per year. About 40% experience six or more outbreaks per year. Active recurrences of herpes are usually less severe than the primary infection. There are fewer blisters, less pain, and the time period from the beginning of symptoms to healing is shorter than the primary infection.

Diagnosis

Because genital herpes is so common, it can be initially diagnosed by symptoms. A Tzanck test can also be used for a quick initial diagnosis. The test is performed using a sample scraped from the base of an active blister. A confirmation of the diagnosis can be done by making a tissue culture of material scraped from the skin lesions, testing the blood for herpes antibodies, or examining fluid and scrapings from the lesions by a method called direct immunofluorescent assay. Since most infants infected with the herpes virus are born to mothers with no symptoms of infection, newborns and pregnant women are often routinely given blood tests called the TORCH antibody panel, which includes a test for herpes. Babies also need to be checked for signs of herpes infection in their eyes. Skin sores and sores in the mouth should be sampled for the presence of herpes simplex.

Treatment

An imbalance in the **amino acidslysine** and **arginine** is thought to be one contributing factor in herpes virus outbreaks. Supplementation with lysine may help maintain the correct balance and prevent recurrences of herpes. Patients may take 500 mg of lysine daily and increase to 1,000 mg three times a day during an outbreak. Intake of foods that are rich in the amino acid arginine should be avoided, including chocolate, peanuts, almonds, and other nuts and seeds.

Clinical experience indicates a connection between high stress and herpes outbreaks. Many people respond well to stress reduction and **relaxation** techniques. **Acupressure** and massage may relieve tiredness and stress. **Meditation**, **yoga**, **t'ai chi**, **acupuncture**, and **hypnotherapy** can also help relieve stress and promote relaxation. Counseling and support groups are often recommended to deal with the emotional and psychological stress of the disease.

An extract of bovine thymus gland can be taken to improve immune function and help the body fight against viral infections such as herpes. Some herbs are also able to serve as antivirals. They include **echinacea** and **garlic** (*Allium sativum*). **Siberian ginseng**, *Eleutherococcus senticosus*, is useful in relieving the stress response that can bring on recurrent herpes outbreaks. Supplementation with beta-carotene and **vitamin E** is recommended during an outbreak. Homeopathic remedies that may be helpful treatments

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for genital herpes include *Rhus tox* 6c and *Apis mellifica* 6c.

There are **traditional Chinese medicine** combinations that are useful for herpes outbreaks. One, called Zhi Bai Lui Wai Di Huang, is a mixture of philodendron and other remedies. Another is Long Dan Xie Gan Tang, a soup made to drain the liver. A traditional Chinese medicine practitioner can help create the right combination specific to the outbreak.

Red marine algae, both taken internally and applied topically, is thought to be effective in treating herpes. Other topical treatments may be helpful in inhibiting the growth of the herpes virus, in minimizing the damage it causes, or in helping the sores heal. **Zinc** may also be used both internally and externally. Oral supplementation coupled with an application of zinc sulfate ointment may help heal sores and fight recurrent outbreaks. Lithium succinate ointment may interfere with viral replication. An ointment made with glycyrrhizinic acid, a component of **licorice** (*Glycyrrhiza glabra*), seems to inactivate the virus. Topical applications of vitamin E oil or **tea tree oil** (*Melaleuca* spp.) help dry up the sores.

Allopathic treatment

There is no cure for a herpes infection. Aspirin may be used to reduce pain and inflammation. Antiviral drugs are available that may lessen the symptoms and decrease the length of outbreaks. There is evidence that some may also help prevent the spreading of the disease and reduce recurrence of future outbreaks. For the best results, treatment with antiviral drugs has to begin during the prodrome stage, before blisters are visible. Depending on the length of the outbreak, drug treatment may continue for up to 10 days.

Acyclovir (Zovirax) is the drug of choice for herpes infection and can be given intravenously, taken by mouth, or applied directly to sores as an ointment. Intravenous acyclovir is given to patients who require hospitalization, usually due to severe primary infections or complications of herpes such as aseptic meningitis or sacral ganglionitis, an inflammation of nerve bundles. Acyclovir reduces the virus shedding period, the duration of the blisters, and the healing time. Patients with herpes outbreaks happening more than six to eight times per year may be given a long-term course of treatment with acyclovir. This is referred to as suppressive therapy. Patients on suppressive therapy have longer periods between herpes outbreaks. Alternatively, patients may use short-term suppressive therapy to lessen the chance of developing an active infection during special occasions such as weddings or holidays. Side effects of acyclovir include **nausea**, **vomiting**, itchy rash, and **hives**. Other drugs that may be used include famciclovir (Famvir), valacyclovir (Valtrex), vidarabine (Vira-A), idoxuridine (Herplex Liquifilm, Stoxil), trifluorothymidine (Viroptic), and penciclovir (Denavir).

Neonatal herpes is a serious condition. Even with treatment, babies may not survive or they may suffer serious damage to the nervous system. Newborns with herpes infections are normally treated with intravenous acyclovir or vidarabine for 10 days. However, infected babies may have to be treated with long-term suppressive therapy. These drugs have greatly reduced deaths and have also increased the number of babies who are relatively healthy by one year of age.

Expected results

Genital herpes is usually not a serious disease, with several major exceptions. Sometimes, a primary infection can be severe and may require hospitalization for treatment. Complications that may arise include aseptic meningitis and nervous system damage. There may also be **constipation**, **impotence**, and difficulty with urination. In addition, people who are immunosuppressed due to disease or medication are at risk for a very severe, and possibly fatal, herpes infection. And even with antiviral treatment, neonatal herpes infections can be fatal or cause permanent nervous system damage.

Prevention

The only way to definitely prevent a genital herpes infection is to avoid contact with infected people, which is not an easy solution because many people are not aware that they are infected. Use of condoms and spermicidal jellies or foams with monoxynol-9 is recommended with all partners whose disease status is questionable or unknown. However, condoms may not protect against herpes when there is skin contact with someone with an open sore that cannot be covered by a condom. Use of dental dams or squares of non-microwaveable plastic wrap is also recommended. Sexual contact should be avoided altogether during a herpes outbreak. Touching affected areas should be avoided, since this can spread the infection to other sites. In order to prevent a child from contracting a herpes infection through contact in the birth canal, doctors usually perform Caesarean sections on women who have active herpes sores when they go into labor.

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KEY TERMS

Culture—A laboratory test in which colonies of microorganisms are grown from tissue samples of an infected individual in order to identify the pathogen.

Immunofluorescent assay—A laboratory technique using a fluorescent dye and a special microscope to identify the cause of an infection.

Meningitis—An infection or inflammation of membranes of the brain and spinal cord.

Sensory root ganglion—A bundle of nerves that help conduct physical sensations.

Tzanck test—A laboratory test using a microscope to examine tissue samples that have been stained with certain dyes.

Urethra—The small tube that drains urine from the bladder.

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ORGANIZATIONS

Centers for Disease Control and Prevention, 1600 Clifton Rd., Atlanta, GA, 30333, (800) 311-3435, http://www.cdc.gov/.

Patience Paradox
David Edward Newton, Ed.D.

Genital warts

Definition

Genital **warts**, or condylomata acuminata, are also called venereal warts. These warts are painless, pink or grayish growths on the skin and mucous membranes of the genitals and anal area. They are usually found in clusters. Genital warts are very contagious and are spread through sexual contact with an infected person.

Description

Genital warts are the second most common sexually transmitted disease (STD), after **chlamydia**, in the general population of the United States. Public health officials estimate that 1% of sexually active people between the ages of 18 and 45 have genital warts. However, studies indicate that approximately 50% of sexually active adults may carry the virus that causes genital warts. Certain **strains** of the virus that cause genital warts may also cause cervical changes and **cancer**.

Causes and symptoms

Genital warts are caused by several subtypes of human papillomavirus (HPV), the same virus that causes warts on other parts of the body. Symptoms develop about one to six months after being exposed to the virus. Once contracted, the virus remains in the infected person's body even though the warts are not visible. In addition to the visible warts, symptoms of the disease may include bleeding, **pain**, odor, **itching**, and redness in affected areas. These symptoms may appear without the warts, and the warts may appear without other symptoms. **Stress** may contribute to recurrent outbreaks.

Genital warts may be difficult to detect. At any given time, at least a quarter of all HPV **infections** are in a state of remission, in which the infection remains dormant in the body, and there are no outbreaks of warts or other readily detected symptoms. In addition,

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Man with genital warts. *(Custom Medical Stock Photo. Reproduced by permission.)*

warts that occur deep inside the vagina, on the cervix, or within the anus may go undetected.

HPV can be transmitted through oral, anal, or genital contact with an infected person, even if warts are not visible. The virus may also be transmitted via objects that have been recently exposed to the virus. These objects may include unwashed or improperly cleaned medical equipment, as well as underwear, tanning beds, and sex toys.

Risk factors for contracting genital warts include:

- multiple sex partners
- infection with another sexually transmitted disease (STD)
- pregnancy
- anal intercourse
- poor personal hygiene
- heavy perspiration

Genital warts vary somewhat in appearance. They may either be flat or resemble raspberries in appearance. The warts begin as small, red or pinkish growths. They may grow in clusters as large as 4 in (10 cm) across, and may interfere with intercourse and **childbirth**. The warts grow on warm, moist tissue. In women, they occur on the external genitalia, the cervix, and the walls of the vagina. In men, they develop in the urethra and on the shaft of the penis. The warts may also spread to the area surrounding the anus.

Diagnosis

Genital warts are usually identified and diagnosed by their characteristic appearance. A sexual history should be taken, and tests for other STDs may be administered. If cervical warts are suspected, a colposcopy exam to view the cervix is necessary for diagnosis. A Papanicolaou (Pap) smear may be performed, and the doctor may order a biopsy of the warts to rule out cancer.

Treatment

Genital warts are contagious and should be assessed and treated under the supervision of a healthcare practitioner. A **traditional Chinese medicine** practitioner or an acupuncturist will probably recommend treatments to cleanse the liver and enhance immune functioning. A generally recommended homeopathic remedy is the application of a tincture of *Thuja occidentalis* (common names **thuja**, northern white cedar, and arborvitae, or tree-of-life) directly to the warts. A homeopathic physician should be consulted for a work-up for further treatment.

The direct topical application of **vitamin A**, thuja, **lomatium** (*Lomatium dissectum*) isolate, or **tea tree oil** (*Melaleuca alternifolia*) helps resolve warts and prevent recurrence of outbreaks. With the exception of the tea tree oil, these herbs should also be taken internally in addition to direct application. Some evidence suggests that deficiencies of **folic acid** and vitamins A and C contribute to genital warts. Such deficiencies may be risk factors for a progression to abnormal cervical cells and cancer; therefore, supplementation is recommended. Beta carotene is often suggested as an alternative to taking high dosages of vitamin A.

Treatments that focus on emotional and psychological factors have been shown to be effective in reducing or eliminating outbreaks of warts. **Hypnotherapy** and techniques of stress reduction and **relaxation** are highly recommended.

Allopathic treatment

There is no cure for genital warts, as the virus cannot be destroyed once it enters the body. The warts themselves may be burned off with electrocautery or lasers, frozen with liquid nitrogen for easy removal, or surgically removed. Podophyllum resin, trichloroacetic acid, interferon inducers, 5-fluorouracil cream, bichloroacetic acid, or trichloroacetic acid can be used as a topical treatment. These medications require several weeks of treatment and may irritate the skin. Pregnant women should be sure to inform their healthcare provider of this condition, as some of the medications for warts may cause fetal abnormalities. Genital warts can also be treated with injections of interferon, either into muscle tissue or directly into the lesions.

Unfortunately, regardless of the treatment regime, genital warts have a high rate of recurrence. Several

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KEY TERMS

Cervix—The entrance to the uterus that protrudes into the vagina.

Electrocautery—A procedure in which heat from an electric current is used to perform surgical procedures.

Mucous membranes—Thin sheets of tissue that cover and protect body passages that open to the outside. These membranes secrete mucus and absorb water and various salts.

Papanicolaou (Pap) smear—A diagnostic test using a sampling of tissue from the cervix.

Papilloma—A benign growth on the skin or mucous membrane.

courses of treatment may be required. Sexual partners should be diagnosed and treated as well. Because of the connection between certain strains of HPV and cervical cancer, infected women should also have yearly Pap smears.

Expected results

As with many warts, genital warts may spontaneously disappear over time. Although the warts are not cancerous by themselves, HPV infection in women appears to increase the risk of later cervical cancer. Recurrence is common with all methods of treatment.

Prevention

The only reliable method of prevention is sexual abstinence. The use of condoms is often recommended; however, condoms protect only a limited area and should not be relied upon for complete protection from genital warts. Circumcision may sometimes prevent recurrence of the visible warts.

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Patience Paradox
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Gentiana

Description

Gentiana is a plant extract made from gentians, which are a group of perennial plants belonging to the Gentianaceae family. There are about 180 species of gentians worldwide. They have a long history of use in healing both in Asian and **Western herbalism**. In the West, the common gentian used in healing is *Gentiana lutea*, or yellow gentian. In China, two different gentians are used in healing, *Gentiana macrophylla*, known in Chinese as *qin jiao*; and *Gentiana scabra*, known in Chinese as *long dan cao*.

G. lutea grows wild or cultivated in many places from Europe to India. It is also cultivated in North America. It grows to a height of about 4 ft (1.2 m), primarily in temperate alpine and subalpine meadows. The plant produces a spike of showy yellow-orange flowers. *G. macrophylla* grows in China and Siberia, and *G. scabra* grows in China and Japan.

There are some differences in height, leaf size, and flower among these three gentians, but the roots and rhizomes (underground stems) used to make gentiana are very similar. Gentians have a single long, strong taproot that can extend as far as 3 ft (1 m) into the earth. The top of the taproot can be as thick as a child's arm and is surrounded by a cluster of rhizomes. The root has an extremely bitter taste. Other names for gentiana include bitter root, bitterwort, and gall weed.

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KEY TERMS

Amargogentin—An extremely bitter substance found in gentian that makes it an effective digestive stimulant.

Rhizome—A rootlike underground stem of a plant.

Stomachic—A substance or medication that sharpens the appetite or stimulates digestion.

Tincture—An alcohol-based extract prepared by soaking plant material.

Tonic—Any medicine given to strengthen and invigorate the body or a specific organ.

General use

Gentiana has been used for centuries. It gets its name from Gentius, King of Illyria (a part of Greece) from 180–167 B.C., who is said to have discovered the medicinal value of these plants. Gentian is one of the most intensely bitter herbs ever discovered. It is an ingredient in Angostura™ **bitters**. At one time it was used as a substitute for **hops** in making beer. Gentiana is also used in small amounts as a food flavoring, and is added to many anti-smoking products.

In Western herbalism, gentiana is used for digestive problems. It is an ingredient in aperitifs that are drunk a half-hour or so before eating to stimulate the appetite and digestion. Liqueurs made using fresh gentiana have been used for generations in Europe; in the eighteenth century gentian wine was served before eating as a stomachic, or aid to digestion.

In addition to stimulating digestion and appetite, gentiana is used to relieve **heartburn** and stomach ache, and to treat **vomiting**, **diarrhea**, abdominal fullness, and intestinal **gas**. Western herbalists also use gentiana for treating **fever**, **sore throat**, **jaundice**, and arthritis. It is used externally to treat **wounds**.

In **traditional Chinese medicine**, *G. macrophylla*, or *qin jiao*, is considered to have a neutral nature and a bitter, pungent taste. It is associated with the liver, stomach, and gallbladder. It is used as a tonic for the digestive system, and to treat arthritis; chronic low-grade fever; jaundice; **hepatitis**; and **constipation**. It is also an ingredient of several common formulas.

According to Chinese herbalists, another gentian, *Gentiana scabra*, or *long dan cao*, has a cold nature and a bitter taste. It is associated with the liver, stomach, gallbladder, and bladder. *Long dan cao* is used in formulas to treat pink eye (**conjunctivitis**); high blood pressure; acute urinary **infections**; testicular **pain**; leucorrhea (whitish vaginal discharge); vaginal pain; tantrums in children; fever; and balance problems.

A long history of folk use coupled with modern scientific investigation shows that gentiana works well as a stomach tonic and digestive stimulant. The German Federal Health Agency's Commission E, established in 1978 to independently review and evaluate scientific literature and case studies pertaining to herb and plant medications, has approved gentiana for use in Germany. It is considered safe and effective in treating such digestive complaints as loss of appetite, abdominal bloating, and gas.

In laboratory studies gentiana was found to contain a substance called amargogentin, which is possibly the bitterest compound ever found. It can be tasted at dilutions of 1:50,000. Its bitterness triggers the secretion of saliva, thus stimulating the production of gastric juice and bile and preparing the digestive system to process food. This reaction makes gentiana effective in treating almost all conditions related to sluggish digestion.

Other research shows that gentiana has selective antifungal, anti-inflammatory, and antispasmodic activity in laboratory experiments. There is much less scientific evidence to support such other traditional uses as treating pain and fever.

Preparations

Gentian roots are harvested in the autumn. They are used fresh in the production of liqueurs, but are dried for medicinal use. The better roots are dried quickly and remain whitish for several months before they darken. Roots that are dried too slowly will ferment.

Gentiana is available in many forms including an extract, dried powdered rhizome, tea, tincture, and decoction. The liquid remedies are very bitter, and sweetening is often added to make them more palatable. Gentian tea can be made by adding 1 tsp of powdered dried rhizome to every 3 cups (750 ml) of water. One tablespoon of this tea is taken about half an hour before eating. Smaller amounts of tincture and decoction can also be taken before eating.

In traditional Chinese medicine, gentiana is used in a formula (*long dan xie gan wan*) to treat chronic bladder infections, herpes, **blisters** in the mouth, and **dizziness**.

Precautions

German health authorities recommend that gentiana not be used by people who have stomach

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(gastric) or intestinal (duodenal) ulcers. In a few sensitive people, gentiana can cause stomach irritation and **headache**. Chinese herbalists recommend that gentiana not be used when there is frequent urination and chronic pain with weight loss.

Side effects

Overdoses of gentiana may cause **nausea** and vomiting.

Interactions

A long history of use in both East and West suggests that there are no interactions with either herbs or modern pharmaceuticals. Few studies, however, have been done to verify these observations.

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Tish Davidson

Gentiana lutea see **Gentiana**

Geriatric massage

Definition

Geriatric massage is a form of massage designed to meet the specific needs of the elderly population. It involves the use of hands to manipulate the soft tissues of the body to improve blood circulation, relieve **pain**, and increase range of motion. Active or passive movement of the joints may also be part of geriatric massage.

Old people often have a variety of such age-related diseases as **Parkinson's disease**, arthritis, diabetes, or **heart disease**. As a result, they have poor blood circulation and limited physical activity. Many of them are also anxious, depressed and lonely. Geriatric massage can help them maintain and improve their overall health, as well as regain certain physical functions that have been reduced or lost due to **aging**. In addition, it can relieve **anxiety** and **depression** and provide comfort to touch-deprived elderly patients.

Origins

Modern massage techniques were brought into the United States from Sweden in the 1850s by two brothers, Dr. Charles and Dr. George Taylor. Their massage technique was invented by a Swedish fencing instructor named Per Henrik Ling in the 1830s. When he was injured in the elbows, he reportedly cured himself using tapping movements around the affected area. He later developed the technique currently known as **Swedish massage**. This massage technique involves the application of long gliding strokes, friction, kneading and tapping movements on the soft tissues of the body. Passive or active joint movements are also used.

Benefits

Geriatric massage offers the following benefits:

- Increase in blood circulation, thus preventing such complications of diabetes as leg ulcers or gangrene.
- Improvement in lymphatic flow, which increases the excretion of toxic substances from the body.
- Alleviation of headache and pain.
- Speeding up of healing from injury and illness.
- Partial restoration of mobility lost due to Parkinson's disease or arthritis.
- Mental and physical relaxation.
- Improvement in length and quality of sleep.
- Relief of stress, anxiety, depression, and loneliness.
- Improvement of the patient's quality of life and self-esteem.

Description

Geriatric massage uses the same basic massage techniques as general massage. It is, however, tailored to the specific health conditions and needs of the elderly population. Geriatric massage has the following characteristics:

- Short sessions. A geriatric massage session usually lasts no longer than 30 minutes, as a longer session may be too much for an elderly person.
- Use of gentle hand motions. These motions are comfortable and soothing to the body. They are designed to improve blood circulation and heart function,

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KEY TERMS

Massage—A rubbing or kneading with hands or other parts of the body to stimulate circulation, make joints more supple, and relieve tension.

Parkinson's disease—A progressive disease caused by degeneration of the basal ganglia of the brain. Its most common symptoms are tremors and muscular rigidity.

Varicose veins—Swollen and distended veins in the superficial skin layer of the legs.

prevent diabetic complications, relieve muscle tension, and relax the body and the mind.

- Passive movement and gentle stretching of shoulders, legs and feet to improve joint mobility and flexibility.
- Gentle massaging of the hands and feet (if the joints are not inflamed) to prevent stiffness and relieve pain.
- Occasional use of stronger movements such as friction and pressure strokes. These are sometimes used to massage such areas as the shoulders to improve flexibility.

Precautions

Geriatric massage should not be used as a replacement for **exercise** programs or medical treatment in nursing homes. In addition, it should not be given to elderly patients with the following conditions:

- broken bones or body areas that are inflamed, swollen or bruised
- open or unhealed bed sores
- varicose veins
- recent surgery
- severe acute pain
- certain heart conditions
- certain kinds of cancer
- a history of blood clots (The blood clots may become dislodged and travel to the lungs as a result of massage.)
- drug treatment with blood thinners (These medications increase the risk of bleeding under the skin.)

Side effects

Geriatric massage is very gentle and rarely causes adverse effects. More vigorous forms of massage, however, have been associated with bleeding in such vital organs as the liver or with the formation of **blood clots**.

Research and general acceptance

Geriatric massage is gaining acceptance in the medical community. It is being prescribed to elderly patients to improve blood circulation and relieve arthritic symptoms. It is sometimes prescribed for Parkinson's disease patients to help improve mobility. While most patients have to pay for this service, some insurance companies do reimburse prescribed massage treatment.

Training and certification

There are 58 school programs accredited by the Commission for **Massage Therapy** Accreditation/Approval in the United States. The schools provide a minimum of 500 hours of massage training. Certified therapists are graduates of these programs who have passed the national certification examination in therapeutic massage. They are also required to participate in continuing education programs to keep their skills current.

Resources

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ORGANIZATIONS

American Massage Therapy Association. 820 Davis St., Suite 100, Evanston, IL 60201. (847) 864-0123. Fax: (847) 864-1178. info@inet.amtamassage.org. http://www.amtamassage.org.

Day-Break Geriatric Massage Project. P.O. Box 1815, Sebastopol, CA 95473.

National Association of Nurse Massage Therapists. 1710 East Linden St., Tucson, AZ 85719.

National Certification Board of Therapeutic Massage and Bodywork. 8201 Greensboro Dr., Suite 300, McLean, VA 22102. (703) 610-9015 or (800) 296-0664.

Mai Tran

German chamomile *see* **Chamomile**

German measles *see* **Rubella**

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Gerson therapy

Definition

Gerson therapy aims to treat the whole person, not just symptoms. It is a general cleansing therapy for the entire body. The therapy can achieve the following: **detoxification**, restoration of metabolic functions, enabling the digestion and elimination of **cancer** masses through the bloodstream, and recovery of the organs, especially the liver.

Origins

Max Gerson was a pioneer in the world of alternative medicine. His therapy proved itself by providing a cure for just about every degenerative disease that plagues modern society, at a time when the first rumblings of disenchantment with so-called "modern medicine" were being heard. Among his initial successes was a 99% cure rate at a sanitarium for **tuberculosis**, unheard of with allopathic medicine. Beginning his work in the 1920s in Germany, he later immigrated to the United States, where in 1938 he was licensed to practice in New York. In 1946 he became the first physician to demonstrate recovered cancer patients before a U.S. Congressional Committee. Gerson had a 50% success rate even with terminal cancer patients that allopathic medicine had given up on. Albert Schweitzer referred to him as "a medical genius that walked among us."

Gerson first began to develop his therapy when he discovered that he could cure himself from terrible migraines by eating nothing but fresh fruit and vegetables.

Benefits

Gerson therapy has reported successes with the following: cancer, migraine, ulcers, **asthma**, **glaucoma**, edemas, **eczema**, diabetes, **schizophrenia**, **emphysema**, **epilepsy**, **allergies**, **psoriasis**, tuberculosis, arteriosclerosis, heart diseases, **rheumatoid arthritis**, kidney diseases, lupus erythematosus, **multiple sclerosis**, and high blood pressure; all of them common diseases and conditions. Gerson demonstrated that dramatic initial improvements can be expected within one week of starting his therapy, which involves taking nothing but absolutely fresh fruit and vegetable juices, coffee, **chamomile** and **castor oil** enemas, and additional nutrients according to the prescription of a practitioner who is conversant with the principles of the Gerson therapy.

KEY TERMS

Healing crisis—When the body is supplied with nutrients it needs to heal itself, the first thing it does is to flush out toxins from the cells. When these toxins are circulating in the bloodstream, they produce symptoms such as nausea, fevers, and extreme sensitivity.

Metabolic—Pertaining to chemical processes within the body that result in growth, production of energy and elimination of waste.

Oxidize—When oxygen reacts with a substance, it causes a decomposition of its living elements.

Toxification—When the body is unable to eliminate poisonous substances, they remain clogged in the system and eventually cause a breakdown of normal function.

Description

Gerson described how our food has been affected by the lowering of the quality of soil with the use of artificial fertilizers and pesticides. He went on to describe the growing of fruits and vegetables as the human being's "external metabolism." He lists numerous examples in his book of people from around the world who were living the same existence that they have lived for centuries, untouched by "civilization." These people, he noted, were living free of the diseases that modern societies considered commonplace.

It is essential that the juices for this therapy are organic; any traces of pesticides will prevent success with diseases such as cancer, for it is only when complete detoxification can be achieved that the body will be able to overcome such scourges.

The length of therapy will probably be between two weeks and two months, depending on the illness. For cancer patients, it may be necessary to follow with an easier form of the diet in order to prevent a recurrence. The cost of therapy varies. If carried out at home under the supervision of a physician, the major expenses will be doctor's visits and organic fruit and vegetables. If clinic treatment is preferred, the Gerson Institute can help and advise.

Preparations

The central theory of the Gerson therapy is fresh juices, which should be drunk immediately after they are prepared. When they are left for longer than 20 minutes, the vital enzymes begin to oxidize, and after

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about 40 minutes, will no longer be suitable for the therapy. The following should also be observed:

- A press type juicer should be used; centrifuges do not produce satisfactory juice for this treatment.
- Fresh veal liver should be juiced (under 4 lb) and the juice drunk raw (Gerson could find nothing better for replacing vital enzymes necessary for repairing the human organism).
- Cooking and enema water should be free of chemicals.
- Salt, tobacco, alcohol, and black tea are forbidden.
- No drugs should be taken except aspirin. Gerson's prescription for pain relief consisted of the following: coffee enemas (given every two hours if necessary), 5 g of aspirin, 100 mg of vitamin C and 50 mg of niacin, up to four times in the course of 24 hours. He noted that this also produced restful sleep in even the worst cases.
- Toothpaste or anything containing fluoride should be eliminated.
- Aerosol sprays, air fresheners, insecticides, paint fumes etc., should be avoided completely.
- Deodorants, hair dye, perms, cosmetics and aluminum cooking pans should be eliminated.
- Proteins, fats and oils must be eliminated, along with all smoked, canned and processed foods.
- The diet should be strictly adhered to, along with all medication, and the prescribed enemas.
- Chemotherapy, radiation therapy etc., must be avoided as they damage the immune system and hinder healing.

Precautions

The Gerson therapy is a powerful tool for detoxification, and can produce healing crises. Most patients experience **nausea** and fevers when the initial flush of toxins is released into the bloodstream. Enemas are designed to help with this, and **peppermint** tea is also recommended. In the case of seriously ill patients, it is advisable to have an understanding practitioner on hand to help with this difficult process. Some of the methods used in Gerson therapy have produced bad outcomes. Coffee enemas have been known to cause deaths and patients undergoing Gerson therapy have been admitted to the hospital with bacterial **infections** most likely caused by ingesting raw calf's liver.

Side effects

Patients are warned that after detoxification by the Gerson therapy, the body becomes hypersensitive to drugs, particularly anesthetic. Dentists should be advised of this, and no drugs should be taken without the advice of a physician.

Research and general acceptance

In 1946 Gerson's therapy was out-voted in congress by four votes in favor of surgery, radiation, and chemicals. This situation remains today, despite increased popularity of alternative and complementary medicine. In 1990, two agencies reviewing patient records could find no evidence that the method was effective in treating cancer. However, many alternative practitioners have shown that detoxification can improve the effectiveness of healing techniques.

Training and certification

The Gerson Institute maintains a list of practitioners specializing in the Gerson method.

Resources

BOOKS

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ORGANIZATIONS

The Gerson Institute. P.O. Box 430, Bonita, CA 92002. (619) 585-7600. Fax: (619) 585-7610. http://www.gerson.org.

Patricia Skinner
Teresa G. Odle

Ginger

Description

Ginger (*Zingiber officinale*) belongs to the Zingiberaceae plant family, which also includes **turmeric** and cardamom. Ginger comes from the Sanskrit word "hornroot." It grows in Jamaica, India, Haiti, Hawaii, and Nigeria. This perennial plant grows 3-4 ft (0.9-1.2 m) tall. It has thin, sharp leaves 6-12 in (15-30 cm) long. The tangled, beige root is used medicinally, and can be 1-6 in (2.5-15 cm) in length. The root has a sharp, pungent taste and aroma.

Ginger contains several chemical components:

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KEY TERMS

Atherosclerosis—Artery disorder where plaque forms on the arteries. The plaque is usually made up of cholesterol and lipids.

Duodenum—The beginning of the small intestine.

Eclectics—Nineteenth century herbal scientists in the United States who founded the Reformed Medical School. Their outlook was based on herbal medicines of Europe, Asia, and Indian.

Lactobacillus—The healthy bacteria found in the intestine.

Lipids—Groups of oily substances, such as fatty acids, stored in the body as energy reserves.

Perennial—A plant that lives for many years; comes back yearly without replanting.

Protease—The enzyme that digests proteins.

Protein—Complex groups of substances (including nitrogen, carbon, oxygen, iron, and hydrogen) that contain amino acids. Protein is vital to all animals because it makes up the hormones and enzymes controlling the body's actions.

Starch—Complex carbohydrates.

- starch (50%)
- protein (9%)
- lipids (including glycerides, phosphatidic acid, lecithins, and fatty acids; 6-8%)
- protease (2.26%)
- volatile oils (including gingerol, shogoal, zingiberene, and zingiberol; 1-3%)
- pungent principles
- vitamins A and B_3 (niacin)

The pungent principles (including the volatile oil gingerol) are the most medicinally potent because they inhibit prostaglandin and leukotriene formations (products in the body that influence blood flow and inflammation). They also give ginger its pungent aroma.

General use

Historically, ginger has been used to aid digestion. According to Michael Castleman in *The Healing Herbs*, ancient Greeks wrapped ginger inside their bread and ate it as an after-dinner digestive. This practice led to their invention of gingerbread. English society concocted ginger beer to soothe the stomach. In the 1800s, the Eclectics used ginger powder and tea for several digestive complaints, including **indigestion**, **gas**, **nausea**, and infant **diarrhea**.

Beginning in the 1980s, several studies have shown that ginger is useful in aiding digestion. A 1999 German study reported the results from 12 volunteers who took 100 mg twice daily of ginger extract when **fasting** and then with a meal. In both instances, ginger was linked to increased digestive movement through the stomach and duodenum.

A study in India published in 2000 reported the effects of ginger (in combination with other spices including cumin, **fenugreek**, and mustard) on pancreatic action in rats. During the eight-week study, the combination of spices in more than a single dose stimulated several **digestive enzymes** in the pancreas.

The Japanese use ginger as an antidote for fish poisoning, especially with sushi. Ginger is thought to fight harmful intestinal bacteria (like *E. coli*, *Staphylococcus*, and *Streptococcus*) without killing beneficial bacteria. Ginger aids *Lactobacillus* growth in the intestines while killing the *Schistosoma* and *Anisakis* parasites.

Because ginger is an antibacterial, it can work against ulcers caused by *Helicobacter pylori*. Ginger creates an anti-ulcer environment by multiplying the stomach's protective components. Ginger's anti-inflammatory abilities have also been shown to help reduce hip and **knee pain** in some **osteoarthritis** patients.

According to a 1998 report that reviewed the results from 10 clinical studies, ginger also helps to suppress the nausea and **vomiting** associated with **pregnancy**. However, a 2002 conference presentation cautions family physicians to reconsider recommending ginger to their pregnant patients because of the possibility for miscarriage.

Ginger lowers **cholesterol** levels by impairing cholesterol absorption, helping it convert to bile acids and then increasing bile elimination. In a 1998 study, rabbits were fed both cholesterol and 200 mg of ginger extract. The rabbits had a smaller amount of **atherosclerosis**. Ginger also enhances blood circulation and acts as a blood thinner.

Coughs can be relieved by drinking ginger tea made from dried or powdered ginger. It is ginger's pungent taste that releases secretions to help throat congestion.

Preliminary studies also show ginger may have potential cancer-fighting properties. No definitive results have been reported and research continues.

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Preparations

Ginger is used in teas, ginger ale, ginger beer, capsules, broths, and as a spice when cooking Asian and Jamaican dishes. Ginger tea for coughs, nausea, digestion, and arthritis can be made by adding 2 tsp (10 ml) of freshly grated root or powdered root to 1 cup (250 ml) of boiling water and steeping for 10 minutes. A cup of the ginger tea, while still warm, should be sipped every 2-2.5 hours.

A compress for arthritic **pain** can be made by grating an unpeeled ginger root in a clockwise direction, then tying it in a moistened muslin cloth, dropping it in a pot of boiling water, and letting it simmer. When the broth is removed from the stove, a cotton cloth is dipped into the broth and the excess moisture squeezed into the pot. While lying flat on the back, the person places the cloth on the aching body part. The broth can also be added to the bath for soaking.

Ginger comes in 250-500 mg capsules of dried ginger root. One to 2 grams of dry powered ginger equals about 1/3 oz of fresh ginger (10 g). A cup of ginger tea contains 250 mg; an 8 oz glass of ginger ale contains 1,000 mg, and a spiced dish contains 500 mg. To prevent **motion sickness**, German health authorities recommend 2-4 g of powdered ginger daily. Another recommended dose is 250 mg four to six times a day.

To bring more blood circulation to arthritic joints, one to two capsules (250 mg each) per day are recommended initially. If results are good, the amount can be increased to six per day, taken between meals.

Ginger can be taken with onions and **garlic**. These agents work in harmony to stimulate the pancreas and decrease cholesterol.

As a blood thinner, two 250 mg capsules of ginger can be taken between meals up to three times a day.

Precautions

Despite studies showing ginger's aid for pregnancy nausea, the German Commission E has recommended that pregnant women not use ginger. Some studies indicate that high amounts of ginger might cause miscarriages. Researchers cannot follow up their suspicions with human clinical trials because of the danger posed to unborn fetuses. Dosages over 6 g could cause gastric problems and possibly ulcers. Ginger may slow down blood clotting time. Before taking ginger, consumers should check dosages with a healthcare provider.

Consumers should not ingest the whole ginger plant; it has been found to damage the liver in animals. Ginger root is not recommended for people with **gallstones**.

Side effects

Ginger may cause **heartburn**.

Interactions

Ginger can interfere with the digestion of iron- and fat-soluble vitamins. Ginger also interacts with several medications. The herb can inhibit warfarin **sodium**, which is a blood thinner. Ginger can also interfere with absorption of tetracycline, digoxin, sulfa drugs, and phenothiazines. Consumers should check with their healthcare provider for drug or other interactions.

Resources

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Sharon Crawford
Teresa G. Odle

Gingivitis *see* **Gum disease**

Ginkgo biloba

Description

Ginkgo biloba, known commonly as the maidenhair tree, is one of the oldest trees on Earth, once part of the flora of the Mesozoic period. The ginkgo tree is the only surviving species of the Ginkgoaceae family. This ancient deciduous tree may live for thousands of years. Ginkgo is indigenous to China, Japan, and Korea, but it also thrived in North America and Europe prior to the Ice Age. That drastic climate change destroyed the wild ginkgo tree throughout much of the world. In China, ginkgo was cultivated in temple gardens as a sacred tree known as *bai gou*, thus assuring its survival there for more than 200

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million years. Ginkgo fossils found from the Permian period are identical to the living tree, which is sometimes called a living fossil.

Ginkgo trees may grow to 122 ft (37.2 m) tall and measure 4 ft (1.2 m) in diameter. The female trees have a somewhat pointed shape at the top, like a pyramid. The male trees are broader at the crown. The bark of the ornamental ginkgo tree is rough and fissured and may be ash to dark-brown in color. Distinctive, fan-shaped leaves with long stalks emerge from a sheath on the stem. Leaves are bright green in spring and summer and turn golden yellow in the fall. Ginkgo trees may take as long as 30 years to flower. Ginkgo is dioecious, with male and female flowers blooming on separate trees. Blossoms grow singly from the axils of the leaf. The female flowers appear at the end of a leafless branch. The yellow, plum-shaped fruits develop an unpleasant scent as they ripen. They contain an edible inner seed that is available in Asian country marketplaces. Ginkgo's longevity may be due, in part, to its remarkable resistance to disease, pollution, and insect damage. Ginkgo trees are part of the landscape plan in many urban areas throughout the world. Millions of ginkgo trees, grown for harvest of the medicinal leaves, are raised on plantations in the United States, France, South Korea, and Japan, and are exported to Europe for pharmaceutical processing.

General use

Ginkgo leaves, fresh or dry, and seeds, separated from the outer layer of the fruit, are used medicinally. Ginkgo has remarkable healing virtues that have been recorded as far back as 2800 B.C. in the oldest Chinese materia medica. Ginkgo seeds were traditionally served to guests along with alcohol drinks in Japan. An enzyme present in the ginkgo seed has been shown in clinical research to speed up alcohol metabolism in the body, underscoring the wisdom of this folk custom. The leaf extract has been used in Asia for thousands of years to treat **allergies**, **asthma**, and **bronchitis**. It is also valued in Chinese medicine as a heart tonic to aid in the treatment of cardiac arrhythmia. Ginkgo was first introduced to Europe in 1730 and to North America in 1784 where it was planted as an exotic garden ornamental near Philadelphia. Ginkgo medicinal extracts are the primary prescription medicines used in France and Germany.

Ginkgo acts to increase blood flow throughout the body, particularly cerebral blood flow. It acts as a circulatory system tonic, stimulating greater tone in the venous system. The herb is a useful and proven remedy for numerous diseases caused by restricted blood flow. European physicians prescribe the extract for treatment of Raynaud's disease, a condition of impaired circulation to the fingers. It is also recommended to treat intermittent claudication, a circulatory condition that results in painful cramping of the calf muscles in the leg that impairs the ability to walk. German herbalists recommend ingesting the extract for treatment of leg ulcers, and large doses are used to treat **varicose veins**. Ginkgo is widely recommended in Europe for the treatment of **stroke**. The dried leaf extract may also act to prevent hemorrhagic stroke by strengthening the blood capillaries throughout the body. In studies of patients with atherosclerotic clogging of the penile artery, long-term therapy with ginkgo extract has provided significant improvement in erectile function. Ginkgo extract also acts to eliminate damaging free radicals in the body and has been shown to be effective in treatment of **premenstrual syndrome**, relieving tender or painful breasts. Other demonstrated benefits include improved long-distance vision and possible action to reverse damage to the retina of the eye. In addition, the ginkgo extract may provide relief for persons with **headache**, sinusitis, and vertigo.

Ginkgo extract is believed to benefit the elderly. This ancient herb is believed by some to enhance oxygen utilization and thus improve memory, concentration, and other mental faculties, and to relieve mild **depression**. Researchers in Germany, working with patients with mild or severe impairment from **Alzheimer's disease** linked ginkgo use to improvement on certain cognitive tests, and in a French study in 2003, researchers credited ginkgo supplements with long-term benefits that could aid in delaying or preventing the development of Alzheimer's disease. However, in a 2007 Tufts University study, reported in *Tufts University Health and Nutrition Letter*, researchers concluded that ginkgo supplements did not improve the mental performance of elderly persons who were not experiencing **dementia**. Researchers acknowledged that the "null findings" in the study might be due to the already high cognitive functioning of study participants.

The active constituents in the ginkgo tree, known as ginkgolides, interfere with a blood protein known as the platelet activating factor (PAF). Other phytochemicals in ginkgo include flavonoids, **bioflavonoids**, proanthocyanidins, trilactonic diterpenes (including the ginkgolides A, B, C, and M), and bilabolide, a trilactonic sesquiterpene. The therapeutic effects of this herb have not been attributed to a single chemical constituent; rather, the medicinal benefits are due to the synergy between the various chemical constituents. The standardized extract of ginkgo must be taken

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consistently to be effective. A period of at least 12 weeks of use may be required before the beneficial results are evident.

Preparations

Ginkgo's active principles are diluted in the leaves. The herb must be processed to extract the active phytochemicals before it is medicinally useful. It would take an estimated 50 fresh ginkgo leaves to yield one standard dose of the extract. Dry extracts of the leaf, standardized to a potency of 24% flavone glycosides and 6% terpenes, are commercially available. A standard dose is 40 mg, three times daily, though dosages as high as 240 mg daily are sometimes indicated.

Ginkgo extracts are widely used in Europe where they are sold in prescription form or over the counter as an approved drug. This is not the case in the United States, where ginkgo extract is sold as a food supplement in tablet and capsule form.

Precautions

Ginkgo is generally safe and non-toxic in therapeutic dosages. Exceeding a daily dose of 240 mg of the dried extract may result in restlessness, **diarrhea**, and mild gastrointestinal disorders. Those on anticoagulants should have their doctor adjust their dose or should avoid ginkgo in order to avoid over-thinning their blood and hemorrhaging. Ginkgo should be avoided two days before and one to two weeks after surgery to avoid bleeding complications. Pregnant women should avoid ginkgo supplements because scientists have discovered a compound called colchicine in the placental blood of women who took ginkgo biloba. A 2002 report cautioned that the compound could cause problems for the growing fetus.

In 2002, a case of ginkgo seed poisoning was reported in a toddler in Japan, but she had ingested 50 or more pieces of roasted ginkgo seeds. She experienced severe **vomiting** and seizures.

Side effects

Severe allergic skin reactions, similar to those caused by poison ivy, have been reported after contact with the fruit pulp of ginkgo. Eating even a small amount of the fruit has caused severe gastrointestinal irritation in some persons. People with persistent headaches should stop taking ginkgo. Some patients on medications for nervous system disease should avoid ginkgo. It can interact with some other medicines, but clinical information is still emerging.

Interactions

The chemically active ginkgolides present in the extract, specifically the ginkgolide B component, act to reduce the clotting time of blood and may interact with antithrombotic medicines, including aspirin.

A study reported in 2007 by Gregory Reed of the Kansas Medical Center examined the possible interactions of ginkgo and ginseng supplements with prescription or over-the-counter drugs with regard to how these drugs are metabolized and eliminated by the body. The scientists concluded that these herbal supplements are "unlikely to alter the pharmacokinetics of the majority of prescription or over-the counter drugs."

Resources

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Clare Hanrahan

Ginseng, American

Description

American ginseng, scientific name *Panax quinquefolius*, is a close relative of **Korean ginseng** (*Panax ginseng*), and belongs to the Araliaceae family, which is the same as **Siberian ginseng** (*Eleutherococcus senticosus*). It is a perennial herb, distinguished by its dark green leaves and clusters of red berries, that grows wild in eastern North America. The root of the plant is used medicinally, particularly in China, where **traditional Chinese medicine** places a high value on it.

Of the traditional ginsengs, American ginseng is probably the least used and researched variety. Americans have never been large consumers of American ginseng. In the past, American ginseng was an uncommon folk remedy used as a mild stimulant, tonic, and digestive aid. Most of this herb was exported to China, where most ginseng is consumed, American ginseng is considered a less potent member of the ginseng family, but it is a highly prized tonic and herbal remedy.

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American ginseng was used medicinally by many Native American tribes as a health stimulant and sexual tonic and for various health problems including headaches, female **infertility**, digestive problems, **fever**, and **earache**. American ginseng was introduced by Native Americans to European settlers in North America in the early 1700s. A French Jesuit priest named Jartoux had traveled through China and was convinced of the medicinal powers of Korean ginseng. In 1714, he published a paper in Britain about Korean ginseng and its healing powers, and theorized that the plant may grow wild in the favorable climate of North America. Another Jesuit missionary in Canada, Joseph Lafitau (1681-1746), read the article and began searching the woods near his dwelling. Lafitau found American ginseng plants, which bear a close resemblance to their Asian cousins, and sent samples of them to China. A thriving trade of American ginseng began around 1718, it was sent to the Orient, gathered by Native Americans, French fur traders, and early frontiersmen including Daniel Boone.

American ginseng grows wild in the forests of the eastern United States and southeastern Canada. It grows in shady, moist and hilly regions, but the plant is becoming increasingly scarce due to over-harvesting and logging practices. In Kentucky, Tennessee, Virginia, and Illinois, American ginseng holds status as a threatened or an endangered species. Some botanists believe that pollution and a thinning ozone layer are contributing to its decline. Efforts at protecting wild American ginseng have not been successful, as the demand for it in the Far East makes it a lucrative crop for poachers. It sometimes sells for as much as $600-800 per pound.

The majority of American ginseng on the market is now cultivated, although it is a sensitive plant and difficult to farm. In the United States, Wisconsin grows 80% of the American ginseng crop. Canada grows more American ginseng than any country, and is second only to China in total ginseng production.

Scientific research

The majority of research performed on ginseng has been done on the Korean and Siberian varieties. Clinical and chemical research on American ginseng is yet to be done. One reason for this is the American medical establishment's skepticism of herbal remedies.

American ginseng is classified as an adaptogen, which is a substance that helps the body adapt to **stress** and improves immune response. Adaptogens must also be non-toxic and cause no major physiological changes or side effects. American ginseng root has an array of complex chemicals, and scientists have determined that the active ingredients are saponin triterpenoid glycosides, or chemicals commonly called ginsenocides. American ginseng contains nearly 30 ginsenocides. However, American ginseng has been found to contain higher levels of ginsenocide Rb1, which has a sedative effect on the central nervous system, than other species of ginseng. Thus, scientific research has been consistent with Chinese herbalists' claims that American ginseng is less stimulating than Korean ginseng. The research implies that American ginseng can provide the strengthening and immune-enhancing effects of other ginseng without overstimulation to those people with high levels of stress and mental stimulation. American ginseng may be the best ginseng for Americans, whose fast-paced and energetic lifestyles may call for more calming and balancing herbs.

KEY TERMS

Adaptogen—Substance that helps the body adapt to any stress.

Ginseng intoxication—Possible side effects of taking *Panax ginseng* products.

Ginsenocides—Active chemicals found in American ginseng.

General use

American ginseng can be used by those people who seek the adaptogenic effects (toning, strengthening, and immune enhancing effects) of *Panax ginseng* without the highly stimulating aspects. Chinese herbalists consider American ginseng to be a cooling herb, so it can be used as a tonic and immune strengthener for people who are over-stressed or who have hot conditions like high blood pressure, excess nervous energy, or ulcers. American ginseng, according to Chinese herbalists, is more suitable and balancing for women and children than *Panax ginseng*, and is more applicable for the elderly who wish to avoid stimulants. American ginseng is also used in Chinese medicine for chronic fevers; to aid in the recovery of infectious diseases; for strengthening the lungs in cases of **tuberculosis**, **bronchitis** and **asthma**; and for the loss of the voice associated with respiratory disorders.

Preparations

American ginseng can be purchased as whole roots, powder, capsules, or a liquid tincture. For whole roots, wild ginseng is the highest quality and also the most

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expensive. Also available are organically grown cultivated roots, which are free from pesticides and chemicals. The easiest way to prepare ginseng roots is to make a tea from them. Ginseng roots are very hard and brittle. They should be sliced and simmered in water for 45 minutes or longer to extract the majority of ginsenocides. Experts recommend avoiding metal pots, which can reduce its antioxidant properties. Some herbalists recommend boiling **ginger** or **licorice** root with American ginseng to increase its effectiveness. For each serving of tea, two or more teaspoons of ginseng root are recommended.

Ginseng root can also be made into a tincture using alcohol, as ginsenocides are soluble and well-preserved in alcohol. Vodka or clear alcohol can be used, and the ginseng roots should be chopped finely or put in a blender with the alcohol. Enough alcohol should be used to completely saturate and cover the roots, and the solution should be kept in a sealed glass bottle for a month or longer. The solution should be shaken frequently to promote the extraction process. The liquid can be strained from the roots after distilling, and kept for up to three years. Half a teaspoon or more of the solution can be taken as a daily serving.

Ginseng powder is also available and can be made into tea or taken with water or juice. One half to one teaspoon is recommended per serving. Extracts of American ginseng are also available in liquid or tablet form, some of which offer standardized quantities of ginsenocides. Packages of standardized products should be labeled with the appropriate dosage.

American ginseng is usually taken two to three times per day between meals. It should not be taken continuously for long periods of time, unless prescribed by a doctor.

Precautions

Pregnant women should use American ginseng only under a doctor's orders and avoid any products that contain *Panax ginseng*.

Consumers should assure that the American ginseng product they purchase is a reputable one. Because of the high price and demand of American ginseng, some questionable products are on the market. Generally wild American ginseng is of higher quality than the cultivated plant, and the older and larger the root, the higher the quantity of ginsenocides present. In addition, consumers should be careful not to confuse American ginseng with *Panax ginseng*, which has been shown to produce more serious adverse side effects. A 2002 report stated that the effects of *Panax ginseng* seemed more likely when the herb was used in combination with other products than when it was used alone.

Side effects

In general, American ginseng is gentle and side effects are rare. Side effects may occur with American ginseng when taken in the wrong dosages, over too long a time, or by people whose constitutions, **allergies**, or health conditions disagree with the herb. Also, products combining Korean ginseng with American ginseng may increase the chances for side effects.

Interactions

Due to the lack of research done on American ginseng, no known interactions are reported.

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New York Ginseng Association. P.O. Box 127, Roxbury, NY 12474. (607) 326-3005.

Douglas Dupler
Teresa G. Odle

Ginseng, Korean

Description

Korean ginseng is one of the most widely used and acclaimed herbs in the world. Its scientific name is *Panax ginseng*, which is the species from which Chinese, Korean, red, and white ginseng are produced. Chinese and Korean ginseng are the same plant cultivated in different regions, and have slightly different

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Dried Korean ginseng. *(Custom Medical Stock Photo. Reproduced by permission.)*

properties according to Chinese medicine. White ginseng is simply the dried or powdered root of Korean ginseng, while red ginseng is the same root that is steamed and dried in heat or sunlight. Red ginseng is said to be slightly stronger and more stimulating in the body than white, according to Chinese herbalism.

Korean ginseng has had a long and illustrious history as an herb for health, and has been used for thousands of years throughout the Orient as a medicine and tonic. Early Chinese medicine texts written in the first century A.D. mention ginseng, and ginseng has long been classified by Chinese medicine as a "superior" herb. This means it is said to promote longevity and vitality. Legends around the world have touted ginseng as an aphrodisiac and sexual tonic. Researchers have found a slight connection between sex drive and consuming ginseng, although a direct link and the mechanism of action are still researched and disputed.

Korean ginseng grows on moist, shaded mountainsides in China, Korea, and Russia. It is a perennial herb that reaches heights of 2 ft (0.8 m) or more, and is distinguished by its dark green leaves and red clusters of berries. The root of the plant is the part valued for its medicinal properties. The root is long and slender and sometimes resembles the shape of the human body. Asian legends claim that this "man-root" has magical powers for those lucky enough to afford or find it, and the roots bearing the closest resemblance to the human body are still the most valuable ones. The word *ren shen* in Chinese means roughly "the essence of the earth in the shape of a man."

Korean ginseng has historically been one of the most expensive of herbs, as it has been in high demand in China and the Far East for centuries. Wars have been fought in Asia over lands where it grew wild. Wild Korean ginseng is now nearly extinct from

KEY TERMS

Adaptogen—Substance that improves the body's ability to adapt to stress.

Ginsenocide—Active substances found in ginseng.

many regions. Single roots of wild plants have recently been auctioned in China and New York City for sums approaching $50,000. Most of the world's supply of Korean ginseng is cultivated by farmers in Korea and China.

Because of the number of herbs sold under the name of ginseng, there can be some confusion for the consumer. Korean ginseng is a member of the *Araliaceae* family of plants, which also includes closely related **American ginseng** (*Panax quinquefolius*) and **Siberian ginseng** (*Eleutherococcus senticosus*). Both American and Siberian ginseng are considered by Chinese herbalists to be different herbs than Korean ginseng, and are said to have different effects and healing properties in the body. To add more confusion, there are eight herbs in Chinese medicine that are sometimes called ginseng, including black ginseng, purple ginseng, and prince's ginseng, some of which are not at all botanically related to *Panax ginseng*, so consumers should choose ginseng products with awareness.

General use

The word *panax* is formed from Greek roots meaning "cure-all," and *Panax ginseng* has long been considered to be one of the great healing and strengthening herbs in natural medicine. Ginseng is classified as an *adaptogen*, which is a substance that helps the body adapt to **stress** and balance itself without causing major side effects. Korean ginseng is used as a tonic for improving overall health and stamina, and Chinese herbalists particularly recommend it for the ill, weak, or elderly. Korean ginseng has long been asserted to have longevity, anti-senility, and memory improvement effects in the aged population. As it helps the body to adapt to stress, athletes may use ginseng as herbal support during rigorous training. Korean ginseng generally increases physical and mental energy. It is a good tonic for the adrenal glands, and is used by those suffering from exhaustion, burnout, or debilitation from chronic illness.

Traditional Chinese medicine also prescribes Korean ginseng to treat diabetes, and research has shown that it enhances the release of insulin from the pancreas and lowers blood sugar levels. Korean

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ginseng has been demonstrated to lower blood **cholesterol** levels. It has also been shown to have antioxidant effects and to increase immune system activity, which makes it a good herbal support for those with **cancer** and **AIDS** and other chronic conditions that impair the immune system. Further uses of Korean ginseng in Chinese medicine include treatment of **impotence**, **asthma**, and digestive weakness.

Research

Scientists have isolated what they believe are the primary active ingredients in ginseng, chemicals termed *saponin triterpenoid glycosides*, or commonly called *ginsenocides*. There are nearly 30 ginsenocides in Korean ginseng. Much research on Korean ginseng has been conducted in China, but controlled human experiments with it have not been easily accessible to the English-speaking world. Recent research in China was summarized by Dr. C. Lui in the February 1992 issue of the *Journal of Ethnopharmacology*, where he wrote that *Panax ginseng* was found to contain 28 ginsenocides that "act on the central nervous system, cardiovascular system and endocrine secretion, promote immune function, and have effects on anti-aging and relieving stress."

To summarize other research, Korean ginseng has been shown in studies to have significant effects for the following:

- Physical improvement and performance enhancement for athletes: A study performed over three years in Germany showed athletes given ginseng had favorable improvement in several categories over a control group who took a placebo. Another 1982 study showed that athletes given ginseng had improved oxygen intake and faster recovery time than those given placebos.
- Mental performance improvement and mood enhancement: In general, studies show that ginseng enhances mental performance, learning time, and memory. One study of sixteen volunteers showed improvement on a wide variety of mental tests, including mathematics. Another study showed that those performing intricate and mentally demanding tasks improved performance when given Korean ginseng. Finally, a study has shown improvement of mood in people with depression with the use of ginseng.
- Antifatigue and antistress actions: Patients with chronic fatigue who were given ginseng showed a statistically significant improvement in physical tests and in mental attention and concentration, when compared with those given placebos.
- Lowering blood sugar: Animal studies have shown that ginseng can facilitate the release of insulin from the pancreas and increase the number of insulin receptors in the body.
- Antioxidant properties: Scientific analysis of ginseng has shown that it has antioxidant effects, similar to the effects of vitamins A, C, and E. Thus, ginseng could be beneficial in combating the negative effects of pollution, radiation, and aging.
- Cholesterol reduction: Some studies have shown that Korean ginseng reduces total cholesterol and increases levels of good cholesterol in the body.
- Anticancer effects and immune system stimulation: Several tests have shown that Korean ginseng increases immune cell activity in the body, including the activity of T-cells and lymphocytes, which are instrumental in fighting cancer and other immune system disorders like AIDS. A Korean study indicates that taking ginseng may reduce the chances of getting cancer, as a survey of more than 1,800 patients in a hospital in Seoul showed that those who did not have cancer were more likely to have taken ginseng regularly than those patients who had contracted cancer.
- Physical and mental improvement in the elderly: One study showed significant improvement in an elderly test group in visual and auditory reaction time and cardiopulmonary function when given controlled amounts of Korean ginseng. Korean ginseng has also been shown to alleviate symptoms of menopause.
- Impotence: Studies of human sexual function and Korean ginseng have been generally inconclusive, despite the wide acclaim of ginseng as a sexual tonic. Tests with lab animals and ginseng have shown some interesting results, indicating that Korean ginseng promotes the growth of male reproductive organs, increases sperm and testoterone levels, and increases sexual activity in laboratory animals. In general, scientists believe the link between ginseng and sex drive is due to ginseng's effect of strengthening overall health and balancing the hormonal system.

Preparations

Korean ginseng can be purchased as whole roots, powder, liquid extracts, and tea. Roots should be sliced and boiled in water for up to 45 minutes to extract all the beneficial nutrients. One to five grams of dry root is the recommended amount for one serving of tea. Herbalists recommend that ginseng not be boiled in metal pots, to protect its antioxidant

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properties. Ginseng should be taken between meals for best assimilation.

Some high quality Korean ginseng extracts and products are standardized to contain a specified amount of ginsenosides. The recommended dosage for extracts containing 4–8% of ginsenosides is 100 mg once or twice daily. The recommended dosage for non-standardized root powder or extracts is 1–2 g daily, taken in capsules or as a tea. It is recommended that ginseng be taken in cycles and not continuously; after each week of taking ginseng, a few days without ingesting the herb should be observed. Likewise, Korean ginseng should not be taken longer than two months at a time, after which one month's rest period should be allowed before resuming the cycle again. Chinese herbalists recommend that ginseng be taken primarily in the autumn and winter months.

Precautions

Consumers should be aware of the different kinds of ginseng, and which type is best suited for them. Red Korean ginseng is considered stronger and more stimulating than white, wild ginseng is stronger than cultivated, and Korean ginseng is generally believed to be slightly stronger than Chinese. Furthermore, American and Siberian ginseng have slightly different properties than Korean ginseng, and consumers should make an informed choice as to which herb is best suited for them. Chinese herbalists do not recommend Korean ginseng for those people who have "heat" disorders in their bodies, such as ulcers, high blood pressure, tension headaches, and symptoms associated with high stress levels. Korean ginseng is generally not recommended for those with symptoms of nervousness, mental imbalance, inflammation, or **fever**. Korean ginseng is not recommended for pregnant or lactating women, and women of childbearing age should use ginseng sparingly, as some studies imply that it can influence estrogen levels. Also, Chinese herbalists typically only prescribe ginseng to older people or the weak, as they believe that younger and stronger people do not benefit as much from it and ginseng is "wasted on the young."

Because of the number of and demand for ginseng products on the market, consumers should search for a reputable brand, preferably with a standardized percentage of active ingredients. To illustrate the mislabeling found with some ginseng products, *Consumer Reports* magazine analyzed 10 nationally-distributed ginseng products in 1995. They found that several of them lacked significant amounts of ginsenocides, despite claims on the packaging to the contrary. Ginseng fraud has led the American Botanical Council to initiate the Ginseng Evaluation Program, a comprehensive study and standardization of ginseng products on the American market. This study and its labeling standards are still under development, and consumers should watch for it.

Side effects

Korean ginseng acts as a slight stimulant in the body, and in some cases can cause overstimulation, irritability, nervousness and **insomnia**, although strong side effects are generally rare. Taking too high a dosage of ginseng, or taking ginseng for too long without a break, can cause *ginseng intoxication*, for which symptoms might include headaches, insomnia, seeing spots, **dizziness**, shortage of breath and gastrointestinal discomfort. Long-term use may cause menstrual abnormalities and breast tenderness in some women.

Interactions

Those taking hormonal drugs should use ginseng with care. Ginseng should not be taken with **caffeine** or other stimulants as these may increase its stimulatory effects and cause uncomfortable side effects. In early 2002, researchers reported that adverse effects and drug interactions from ginseng were more likely to occur when it was used in combination with other products than when ginseng was used alone.

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Douglas Dupler
Teresa G. Odle

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Ginseng, Siberian

Description

Siberian ginseng, *Eleutherococcus senticosus*, is also known as eleuthero ginseng or eleuthero. It is in the same botanical family as **Korean ginseng** (*Panax ginseng*) and **American ginseng** (*Panax quinquefolius*). Siberian ginseng is one of the most widely used herbs in the world.

Siberian ginseng is a thin, thorny shrub that grows up to 15 ft (4.6 m) high. It is native to forests in southeastern Russia, northern China, Japan, and Korea. The root of the plant is used medicinally.

The family of ginseng plants has historically been used for medicinal purposes. Korean ginseng, also called Asian, red, or white ginseng, has been used in China for thousands of years. In China, it is a celebrated herb known to promote strength, energy, and longevity. American ginseng was discovered in North America in the early 1700s, and has since been used as a medicine and tonic. Siberian ginseng has been used in Chinese medicine for more than 2,000 years, to increase energy and vitality and to treat respiratory and other **infections**, although Chinese herbalists use Korean and American ginseng much more frequently. Siberian ginseng was used in Eastern Europe as a folk remedy for hundreds of years, but it was not until the 1940s that it became a popular herb in Russia and Europe.

The Russian physician I. I. Brekhman is credited with making Siberian ginseng popular. Brekhman had studied Korean ginseng in the 1940s and documented some of its effects on the body. He determined that ginseng was an adaptogen. To be classified as an adaptogen, an agent must be shown to help the body adapt to **stress**, improve balance and overall immune function, be non-toxic and cause minimal side effects. Brekhman searched his native Russian forests for an alternative to expensive Korean ginseng, and concentrated on Siberian ginseng. Brekhman discovered that Siberian ginseng was also an adaptogen, offering some of the same benefits of Korean ginseng, although containing a different chemical composition.

During the next 30 years in the Soviet Union, Siberian ginseng became the focus of many studies. It was found to increase endurance and performance of athletes, and many famous Soviet Olympic champions included Siberian ginseng as part of their training programs. Siberian ginseng was so touted that Soviet astronauts carried it into space with them, as opposed to the amphetamines carried by American astronauts.

KEY TERMS

Adaptogen—Substance that helps the body adapt to stress.

Eleutheroside—Active chemical found in Siberian ginseng.

Soviet scientists found that Siberian ginseng strengthened the immune system, and gave Siberian ginseng to highly stressed workers as herbal support. After the Chernobyl nuclear accident, Siberian ginseng was given to people who had been exposed to radiation.

Research

Siberian ginseng's active ingredients are a complex group of chemicals called *eleutherosides*. Eleutherosides are different than the ginsenocides found in the *Panax* varieties of ginseng, which is consistent with Chinese herbalists' claims that Siberian ginseng acts differently in the body than Korean or American ginseng. There has been some debate among herbalists whether Siberian ginseng should be considered a true ginseng at all, due to this difference in active ingredients.

Much of the research done on Siberian ginseng was performed by Soviet scientists in the former Soviet Union. Many of the study results are still unavailable in English. Those that have been translated and more recent studies have corroborated the benefits of Siberian ginseng.

- Siberian ginseng has been documented in many studies to improve physical endurance, oxygen uptake, recovery, and overall performance in athletes, ranging from runners to weightlifters. A 1986 study in Japan showed that eleuthero ginseng improves oxygen uptake in exercising muscle.
- Siberian ginseng normalized blood pressure in patients with high and low blood pressure. Siberian ginseng has been shown to reduce stress symptoms in general. A 1996 study in Japan concluded that Siberian ginseng can protect against gastric ulcers.
- Animal studies showed Siberian ginseng helped fight against toxic chemicals and exposure to harmful levels of radiation. A 1992 Russian study showed that Siberian ginseng reduced the occurrence of tumors in rats when exposed to radiation. Another Russian study showed that women undergoing radiation for breast cancer had a significant reduction of side effects when given Siberian ginseng.

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A 1987 German study, using human subjects in a double-blind test, demonstrated that eleuthero ginseng boosts immune system response and enhances the body's overall resistance to infection. Other studies have shown that Siberian ginseng increases activity of lymphocytes and killer cells in the immune system.

General use

Siberian ginseng can be used as an overall strengthener for the body and immune system. It is an effective herbal support for stress, **fatigue**, and exhaustion; for athletes in training; for prevention of colds and flus; for those undergoing chemotherapy or radiation treatment; and for people with chronic diseases such as chronic fatigue, **fibromyalgia**, or **AIDS**. Siberian ginseng is also used to aid recovery from nervous conditions like **depression**, **anxiety**, or nervous breakdown.

A group of Armenian researchers reported in 2003 that a compound containing Siberian ginseng is safe and effective in treating familial Mediterranean **fever**, an inherited disorder characterized by recurrent attacks of fever and severe abdominal **pain**.

Preparations

Siberian ginseng is available as a fresh root or dried root powder, tea, liquid extract, or capsule/tablet form. The recommended dosage for root powder is 1–2 g daily, taken in capsules or mixed with water or juice. Dosages should be divided and taken two or three times per day, between meals. The dosage for the liquid extract is1–2 ml twice daily. Recently, Siberian ginseng products have been made available that contain standardized percentages of eleutherosides. Siberian ginseng can be taken continuously, but it is generally recommended that for every three months of ginseng use, two- to four-week rest periods should be observed. Siberian ginseng is sometimes combined with other adaptogens, like Korean or American ginseng, **astragalus**, or **schisandra**, to increase its effectiveness.

Precautions

Pregnant women and children should use Siberian ginseng with caution, consulting a practitioner prior to use. Those taking hormonal drugs should use ginseng with care. Furthermore, consumers should be aware of the different medicinal properties of Korean, American, and Siberian ginseng, in order to choose the herb best suited for their constitution and health conditions.

Consumers should choose only high-quality ginseng products made by reputable manufacturers. In a 1995 *Consumer Reports* magazine analysis of 10 nationally distributed ginseng products, several brands were lacking in active ingredients. Ginseng product fraud has led the American Botanical Council to initiate the Ginseng Evaluation Program. Started in 1993, this program provides a comprehensive study of ginseng products and has enacted measures to reduce mislabeling and increase consumer confidence in ginseng products. In 1999, however, the Center for Food Safety and Applied Nutrition of the Food and Drug Administration (FDA) reported several instances of Siberian ginseng products that contained pieces of the roots and leaves of a hazardous plant, *Periploca sepium*.

Side effects

In general, side effects with Siberian ginseng are rare and more mild than those that occur with American and Korean ginseng. Mild **diarrhea** has been reported with its use, and **insomnia** may occur if it is taken too close to bedtime.

Siberian ginseng appears to be less likely than most herbs to interact with other medications. Researchers in South Carolina reported in 2003 that Siberian ginseng did not affect the body's metabolism of such drugs as dextromethorphan and benzodiazepine tranquilizers when the ginseng was taken in recommended dosages.

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American Botanical Council. P.O. Box 144345, Austin, TX 78714-4345. (800) 373-7105. http://www.herbalgram.org.

National Center for Complementary and Alternative Medicine (NCCAM) Clearinghouse. P.O. Box 7923, Gaithersburg, MD 20898-7923. (888) 644-6226. http://nccam.nih.gov.

New York Ginseng Association. P.O. Box 127, Roxbury, NY 12474. (607) 326-3005.

U. S. Food and Drug Administration (FDA). 5600 Fishers Lane, Rockville, MD 20857. (888) 463-6332. http://www.fda.gov.

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Glaucoma

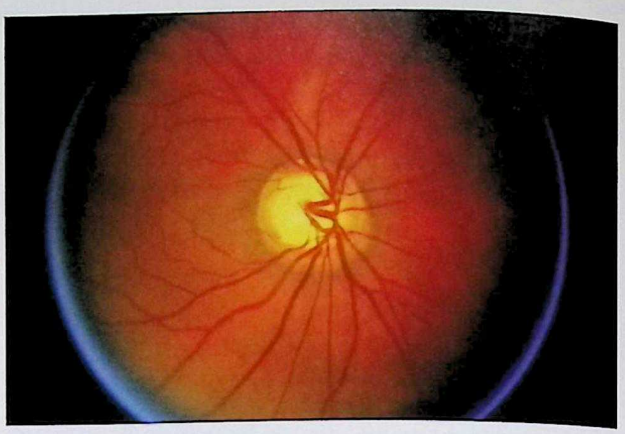
Definition

Glaucoma is a group of slowly progressive disorders that affects the eye and can result in irreversible damage to the optic nerve. Glaucoma represents one of the leading causes of irreversible blindness in the United States and world-wide. It is the leading cause of blindness among African Americans and older adults in the United States. Because there are usually no symptoms early on in the disease, about half of the people with glaucoma do not even know they have it.

Description

More than two million people in the United States have glaucoma, and 80,000 of those are legally blind as a result of the disease. Glaucoma can strike any age group, even newborn infants. Susceptibility to the disease, however, increases with age. African Americans are at a three times higher risk of glaucoma than the rest of the population.

There are at least 20 different types of glaucoma. These can be divided into four main types:



Opthalmoscope view of the retina of an eye with glaucoma. *(Stanford Eye Clinic / Photo Researchers, Inc.)*

- Open-angle glaucoma, which accounts for over 60–70% of all cases, and is usually chronic and often bilateral.
- Closed-angle glaucoma, which is usually an acute condition, as opposed to open-angle glaucoma, which is chronic.
- Congenital glaucoma, which occurs in infants, usually under the age of one.
- Secondary glaucoma, which may be associated with eye diseases, other diseases, and certain types of medications.

Causes and symptoms

Glaucoma is the result of disruptions of normal processes to maintain pressure within the eye tissue. The iris, cornea, and lens of the eye are bathed in a nutritive liquid called the aqueous humor, which is made by cells within the eye. Excess fluid is continually removed by a spongy meshwork of drainage canals. Glaucoma occurs if there is a build up of the aqueous humor due to poor drainage or overproduction. As the fluid builds up there is increased pressure on the retina at the back of the eye. This increased pressure reduces the blood supply to the nerves of the retina and causes the nerves to die, which may distort and destroy the optic nerve. As nerve cells are destroyed, blind spots develop, and there is a progressive loss of vision. A change in the production and strength of collagen may also contribute to the onset of the disease. Collagen is a protein that helps maintain the structure and function of eye tissue. **Stress** and **allergies** may aggravate glaucoma symptoms.

It is probable that most cases of glaucoma are partially due to a genetic predisposition. At least 10 defective genes have been identified that may cause

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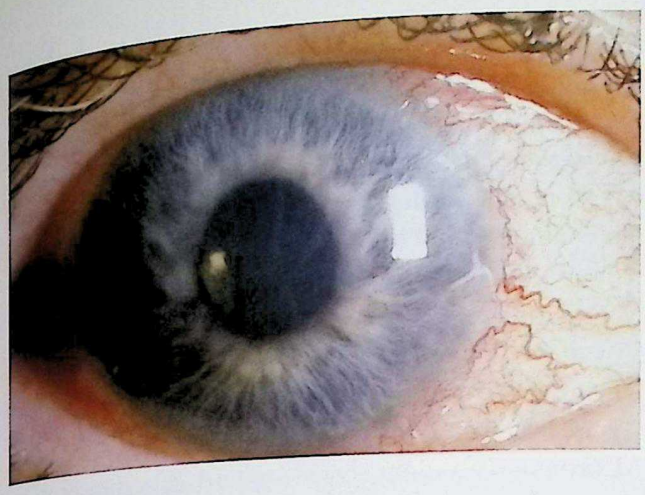

Acute glaucoma. *(© Medical-on-Line / Alamy)*

glaucoma. Although there are still many unknown factors that trigger the disease, a number of processes have been implicated. They include age-related changes, congenital abnormalities, injuries to the eye tissue, and problems related to other eye diseases. Vision loss in all forms of glaucoma is caused by damage to the optic nerve, the retina, and the collagen protein that makes up eye tissue. Use of certain medications, including antihypertensives, antihistamines, anticholinergics, and antidepressants may also contribute to the development of glaucoma. Corticosteroid eye drops, which are often used for other eye disorders, may destroy the integrity of eye tissue. Other types of eye drops may cause the pupils to dilate, increasing intraocular eye pressure (IOP), which may also lead to glaucoma in those who have a tendency to the disease.

Chronic open-angle glaucoma at first develops without noticeable symptoms. The pressure buildup is gradual, and it does not bring on discomfort. Moreover, the vision loss is too gradual to be noticed at first, and the brain compensates for blind spots. Over an extended period of time, though, the elevated pressure pushes against and damages the optic nerve and the retina. If glaucoma is left untreated, vision loss becomes evident, and the condition becomes painful.

Acute closed-angle glaucoma is obvious from the beginning. The symptoms are blurred vision, severe eye **pain**, sensitivity to light, **nausea** and **vomiting**, dilated pupils, reddened eyes, and halos visualized around lights. The corneas may become hazy in appearance. Acute closed-angle glaucoma is an emergency situation. It needs to be treated immediately. Congenital glaucoma is evident at birth. Symptoms are bulging eyes, cloudy corneas, enlarged corneas, excessive teariness, and sensitivity to light.

Risk factors that increase the probability of developing glaucoma include:

- ocular hypertension, a slightly increased IOP
- age over 40
- diabetic conditions
- high blood pressure
- migraine headaches
- nearsightedness, farsightedness, and other visual disturbances
- a family history of glaucoma
- being of African American or Hispanic ethnicity

Diagnosis

Sometimes glaucoma can be diagnosed with a routine eye exam by an ophthalmologist, who can make a definitive diagnosis of glaucoma. IOP, defects in the field of vision, and the appearance of the optic nerve, are all considered in the diagnosis of glaucoma. Visual field tests can detect blind spots in a patient's field of vision before the patient is aware of them. An instrument, known as a tonometer, is used to measure eye pressure. Since IOP can vary throughout the day, a person may have to return for several visits to measure eye pressure at different times of the day. An ophthalmoscope is used to examine the inner aspects and the back of the eyes, including the optic nerve, for changes and damage. A slit lamp may be used to allow the doctor further examination of the eye. Another test, gonioscopy, can distinguish between narrow-angle and open-angle glaucoma. A gonioscope allows visualization of the angle between the iris and the cornea. A subsequent technology is optical coherence tomography (OCT) that produces high-resolution images of the anterior segment of the eye and is a non-invasive procedure. As of 2007, it was primarily used in conjunction with gonioscopy in diagnosing and assessing glaucoma.

Treatment

There is no cure for glaucoma; however, it can be treated with both traditional and alternative medicine. **Vitamin C**, taken in dosages up to bowel tolerance, is reported to reduce pressure within the eye and restore collagen balance. A vitamin C supplement with **bioflavonoids**, especially rutin and **lutein**, are particularly recommended. **Bilberry** (*Vaccinium myrtillus*) helps maintain collagen balance and prevents the breakdown of vitamin C. Many people with glaucoma have been shown to have deficiencies of **chromium** and **zinc**. Supplementation with these two minerals may, therefore, deter the onset or progression of the disease. Alpha lipoic acid and other **antioxidants** may improve visual functioning.

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A naturopathic approach called contrast **hydrotherapy** can be used to stimulate circulation in the eyes. Compresses can be applied over the eyes, alternating three minutes with hot water and one minute with cold water, always ending with the cold. **Biofeedback** can be used to reduce the pressure in the eyes by increasing **relaxation**. **Meditation**, stress reduction, **t'ai chi**, **yoga**, **exercise**, and **acupuncture** also may lower IOP. Remedies used to lower IOP must be taken continually to avoid optic nerve damage. In addition to other treatments, a glaucoma patient should always remain under the care of an ophthalmologist or optometrist who is licensed to treat glaucoma, so that IOP and optic nerve damage can be monitored.

Since the early 1970s, a number of scientific studies reported that the active agents in **marijuana** (*Cannabis sativa*) are effective in lowering intraocular pressure (IOP) in people with glaucoma. One study reported that people with glaucoma who smoked marijuana had a 25% to 30% drop in IOP that lasted three to four hours. Under federal law, the use, possession, or sale of marijuana is illegal in the United States. However, as of 2007, twelve states had legalized the medical use of marijuana. In 2005, the U.S. Supreme Court ruled that federal laws against medical marijuana take precedence over state laws, allowing for continued federal prosecution against people who use marijuana for medical purposes. Despite the ruling, medical marijuana programs continue in several states, including California. The active agents in marijuana are cannabinol, cannabidiol, and delta-9-tetrahydrocannabinol (THC). A synthetic version of THC, dronabinol (Marinol), is available in the United States and can be legally prescribed for a number of conditions, including glaucoma.

KEY TERMS

Alpha-2 agonist—A class of drugs that bind to and stimulate alpha-2 adrenergic receptors, causing responses similar to those of adrenaline and noradrenaline, by inhibiting aqueous humor production.

Beta-blocker—A class of drugs that bind beta-adrenergic receptors and thereby decrease the ability of the body's own natural epinephrine to bind to those receptors, leading to the reduction of aqueous humor secretion.

Cornea—The clear, bowl-shaped structure at the front of the eye located in front of the colored part of the eye. The cornea lets light into the eye and partially focuses it.

Gonioscope—An instrument that consists of a magnifier and a lens equipped with mirrors and sits on the patient's cornea.

Miotic—A drug that causes pupils to contract.

Ophthalmoscope—An instrument, with special lighting, designed to view structures in the eye.

Optic nerve—The nerve that carries visual messages from the retina to the brain.

Retina—The light-sensitive layer of the eye.

Allopathic treatment

The objective of glaucoma treatment is usually to decrease IOP. When glaucoma is diagnosed, drugs, typically given as eye drops, are usually tried before surgery. Several classes of medications are effective at lowering IOP and, thus, at preventing optic nerve damage in chronic and neonatal glaucoma. These include beta-blockers, such as Timoptic, and carbonic anhydrase inhibitors, such as acetazolamide. Alpha-2 agonists, such as Alphagan, inhibit the production of aqueous humor. Miotics, such as pilocarpine, and prostaglandin analogues, such as Xalatan, increase the drainage of aqueous humor. Different medications lower IOP different amounts, and a combination of medications may be necessary. Attacks of acute closed-angle glaucoma are medical emergencies. In such cases, IOP is rapidly lowered by use of acetazolamide, hyperosmotic agents, a topical beta-blocker, and pilocarpine. All of these drugs have side effects, some of which are rare, but serious and potentially life threatening. Patients taking them should be monitored closely, especially for cardiovascular, pulmonary, and behavioral symptoms. IOP should also be monitored and measured three to four times per year.

Laser peripheral iridiotomy or other microsurgery is used to open the drainage canals or to make an opening in the iris to increase the outflow of aqueous humor. These surgeries are usually successful, but effects often last less than a year. Nevertheless, they are an effective treatment for patients whose IOP is not sufficiently lowered by drugs or for those who cannot tolerate the drugs. Surgery is usually used in cases of congenital glaucoma, since the medications are often too harsh for children. Youngsters often respond to surgery better than adults, and have an excellent chance for preserving lifelong good vision.

Expected results

If glaucoma is left untreated, optic nerve damage will result in a progressive loss of vision. Once blindness develops due to glaucoma, it cannot be reversed.

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With early treatment and monitoring serious vision loss can usually be prevented.

Prevention

While glaucoma is not preventable, early detection and treatment can help to prevent serious damage to vision. Those with risk factors should have regular eye exams and avoid medicines that tend to be implicated in the development of glaucoma, including some over-the-counter cold and allergy medications. All medications should be checked for their ingredients. Alternatives for drugs that aggravate glaucoma should be discussed with a healthcare provider.

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American Academy of Ophthalmology, PO Box 7424, San Francisco, CA, 94120-7424, (415) 561-8500, http://www.aao.org.

Glaucoma Foundation, 80 Maiden Lane, Suite 1206, New York, NY, 10038, (212) 285-0080, http://www.glaucomafoundation.org.

National Eye Institute, 31 Center Dr., MSC 2510, Bethesda, MD, 20892-2510, (301) 496-5248, http://www.nei.nih.gov.

Optometric Glaucoma Society, 5553 Taft Ave., Oakland, CA, 94618, (925) 557-4181, http://www.optometricglaucomasociety.org.

Patience Paradox
Ken R. Wells

Glucosamine

Description

Glucosamine is an amino sugar that occurs naturally in the body. This one-molecule substance consists of glucose and a hydrogen and nitrogen amine. Amino sugars are different from other body sugars, as they form part of carbohydrates. Their function is also different as they are not a source of energy, but rather are included in body tissue structure. Therefore, glucosamine plays a role in forming and maintaining the body's tissues, for example, constructing nails, skin, eyes, bones, ligaments, tendons, heart valves; and discharging mucus from the respiratory system, digestive system, and urinary tract. Glucosamine helps blend **sulfur** into the cartilage. When people grow older, their bodies may lose the capacity to make enough glucosamine, so the cartilage in such weight-bearing joints as the hips, knees, and hands is destroyed. The remaining cartilage then hardens and forms **bone spurs**, causing **pain**, deformed joints, and limited joint movement.

Glucosamine is not readily available from any primary food source. Commercial preparations of glucosamine are derived from chitin, which is a substance found in the outer covering of such shellfish as lobster, crab, and shrimp, as well as in such animal connective tissues as the marrow of chicken bones. Commercially prepared glucosamine comes in three formats: glucosamine sulfate, glucosamine hydrochloride, and N-acetyl-glucosamine (NAG).

General use

Glucosamine works to stimulate joint function and repair. It is most effective in treating **osteoarthritis** (OA), the most prevalent type of arthritis. A number of studies between 1980 and the early 2000s showed that glucosamine is helpful in relieving arthritis

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symptoms. For example, a 1982 clinical study compared usage of the NSAID ibuprofen with glucosamine sulfate, for osteoarthritis of the knee. During the first two weeks, ibuprofen decreased pain faster, but by the fourth week the glucosamine group was well ahead in pain relief. The overall results showed 44% of the glucosamine group had pain relief compared to 15% for ibuprofen. A British study published in 2002 reported similar findings regarding the effectiveness of glucosamine in relieving pain associated with arthritis. A team of Japanese researchers suggested that glucosamine relieves the pain of arthritis by suppressing the functions of neutrophils, which are white blood cells that contribute to the joint inflammation found in arthritis. Other researchers speculated that the sulfur content of glucosamine contributes to its healing properties.

Several studies have concluded that over-the-counter preparations of glucosamine sulfate are safe for long-term treatment of osteoarthritis. These are readily available in the dietary supplement sections of most pharmacies. Glucosamine preparations are sometimes classified as nutraceuticals, a term used to refer to foods or food ingredients that are thought to provide medical or health benefits.

Harvard Medical School conducted a somewhat unorthodox study in which patients scheduled for hip surgery were given ground chicken bone supplements. After two weeks of taking these supplements, their pain was reduced considerably.

Glucosamine supplements can also aid in treating sports injuries, **bursitis**, food and respiratory **allergies**, **asthma**, **osteoporosis**, **tendinitis**, **vaginitis**, some skin problems, and candidiasis.

As of 2002, however, updated guidelines issued by the American College of Rheumatology for the treatment of osteoarthritis continued to list glucosamine along with **acupuncture** and electromagnetic therapy as treatments that were still under investigation for treating OA. Although there was considerable clinical experience with glucosamine, the mechanism of action was not determined, and, and analysis of published studies was inconclusive. In one study, sponsored by the National Institutes of Health (NIH), the Glucosamine/Chondroitin Arthritis Intervention Trial (GAIT), which enrolled 1,583 patients with painful knee osteoarthritis, 39 individuals failed to reveal an effect of glucosamine or **chondroitin** alone or in combination when compared to placebo. However, this study tested glucosamine hydrochloride, while more favorable studies have used glucosamine sulfate. Also, the favorable placebo response of 60% made analysis of the data difficult. When so many patients respond favorably to the placebo, it can be difficult to show a significant difference between the active drug and the inactive control. A review by the Arthritis Center of Boston University School of Medicine warned: "Trials of glucosamine and chondroitin preparations for (osteoarthritis) symptoms demonstrate moderate to large effects, but quality issues and likely publication bias suggest that these effects are exaggerated."

One study from the Rheumatology Unit, Department of Clinical and Experimental Medicine of the University of Padova, Italy, offered a mechanism of action explaining the observed physiologic effects of glucosamine. In their observation, glucosamine sulfate has anti-oxidant properties and inhibits natural oxidative stress that can cause unfavorable alterations of cartilage. These observations would explain the clinical reports of glucosamine activity and differentiate it from a placebo response.

Preparations

Although commercially prepared glucosamine comes in three formats (glucosamine sulfate, glucosamine hydrochloride, and N-acetyl-glucosamine (NAG)), not all three work the same. There are also differing opinions on which is best.

One claim states that glucosamine hydrochloride works 50% better than glucosamine sulfate because hydrochloride is the main stomach acid helping the digestive system to put more active ingredients into the body. Another prefers glucosamine sulfate because of its high absorption rate of 98% documented in human studies and its sulfur content. Studies as far back as the 1930s show that people with arthritis usually have low levels of sulfur.

N-acetyl-glucosamine (NAG) can be beneficial to individuals with **Crohn's disease** or ulcerative **colitis**. Individuals with these diseases cannot change glucosamine to NAG as fast as those without the diseases. In one study, cells from patients' intestines were soaked in a solution with a 10:1 ratio of radioactive NAG to glucosamine. These cells consolidated more NAG than did the cells from the intestines of patients without Crohn's disease or ulcerative colitis.

Glucosamine is also sold mixed in formulas with **devil's claw**, pregnenolone, methylsulfonylmethane (**MSM**), and chondroitin sulfate. Chondroitin sulfate is one of the main glycosaminoglycans (GAGs) that is contained in shark cartilage and sea cucumber. Although studies show that chondroitin sulfate has benefits, it is hard to absorb because it contains large molecules.

Further confusion can arise because glucosamine is classified and sold as a dietary supplement, meaning

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KEY TERMS

Amino acids—Organic acids containing nitrogen that are the building blocks of proteins.

Carbohydrates—Organic substances, usually from plant sources. They are made up of carbon, hydrogen, and oxygen and are the diet's major source of energy.

Chitin—A transparent horny substance found in the outer coverings of shellfish. Chitin is used to make commercial preparations of glucosamine.

Glucose—Simple sugar that serves as the main energy source for cells.

NSAIDs—Nonsteroidal anti-inflammatory drugs given to suppress inflammation. Ibuprofen is a typical NSAID.

Nutraceutical—A food or food ingredient that is thought to provide medical or health benefits. Glucosamine preparations are classified as nutraceuticals.

Osteoarthritis—Degenerative joint disease that affects the hips, knees, or spine. Pain occurs after exercise and the joints can become stiff and swell. This common type of arthritis occurs in 80% of people over 50.

Placebo—A substance that has no therapeutic effect. A placebo may be prescribed for the psychological benefit of the patient, or it may be used as a control in testing new drugs.

Rheumatology—The medical specialty that studies and treats disorders of the joints and muscles.

Tendinitis—Inflammation of tissues that connect muscles to bones. Tendinitis is usually caused by strain or an injury.

that it had not gone through the FDA approval process.As with any dietary supplement, patients with arthritis who are considering glucosamine formulations should consult their healthcare practitioner.

The standard dosage is 500 mg three times daily. Obese people may need to take higher dosages based on their weight.

Precautions

Persons on potassium-reduced **diets**, with **heart disease**, renal diseases, or high blood pressure related to salt intake should avoid either the regular or salt-free glucosamine supplements.

Diabetics should be aware that glucosamine contains the sugar glucose and can raise blood sugar and insulin levels. A 2000 study of 15 nondiabetic patients at the Los Angeles College of Chiropractic and Meta-Response Science showed that those who took 1,500 mg of glucosamine a day for 12 weeks had raised insulin levels. The conclusion was that the insulin rise would probably be more in diabetics. However, researchers cautioned diabetics that so far there was no need to discard their glucosamine supplements as more controlled studies were required.

Despite the concern regarding the use of glucosamine sulfate in persons with allergies to the sulfa drugs or the sulfite additives in food, sulfur itself is a necessary mineral and human blood contains large amounts of sulfur's sulfate form. Studies show that glucosamine sulfate is safe for long-term use to treat osteoarthritis, with the exception of some medical conditions.

Side effects

High dosages of glucosamine may cause gastric problems, **nausea**, **diarrhea**, **indigestion**, and **heartburn**. Glucosamine should be taken with meals to help avoid these problems

Interactions

Glucosamine should not be taken with heart medications or insulin. Those taking diuretics may require higher amounts of glucosamine on a daily basis.

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ORGANIZATIONS

American College of Rheumatology, 1800 Century Place, Suite 250, Atlanta, GA, 30345-4300, (404) 633-3777, http://www.rheumatology.org.

Sharon Crawford
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Glutamine

Description

In healthy individuals, glutamine is a neutral, nonessential amino acid. **Amino acids** are critical to humans, since they form the proteins that are the building blocks for many body tissues, including muscles. Glutamine is the most abundant amino acid in the human body. It performs several important functions in the body and is particularly important when the body is stressed. If not enough glutamine is being created by the body, the body's natural supply can be supplemented with outside sources. Glutamine is sometimes recommended by physicians, and sometimes it is taken as a dietary supplement without physician advice.

General use

Researchers continued as of 2008 to study glutamine's properties and effects. It is the most plentiful amino acid in the bloodstream. In cases of extreme **stress** the body's ability to produce glutamine can be overwhelmed by the body's demand for it. **Cancer**, **burns** or trauma, excessive **exercise**, and other stressors may cause glutamine levels to drop.

Research suggests that when glutamine levels fall and are not replaced, several body functions are affected, particularly within the digestive tract. Glutamine is also believed to be important to overall immunity. Between 1970 and 2000, interest grew for use of glutamine in helping cancer patients. Research continued as of 2008 on using glutamine therapy to help patients with sepsis, burns, trauma, **inflammatory bowel disease**, acquired immune deficiency syndrome (**AIDS**), bone marrow transplants, and many other diseases and conditions.

Some clinical research has reported glutamine aided patients with multiple trauma and burns by helping them fight off **infections**. It may help AIDS patients put on weight at a much lower cost, and with fewer complications, than human growth hormone. Athletes who overtrain have higher rates of infectious diseases and **allergies**; it is thought that a diet high in glutamine can help improve these athletes' immune functions.

As more people began looking for ways to enhance fitness, they turned to protein supplements. Every year, more than one million athletes use some type of performance-boosting supplement. Glutamine is used in the fitness industry as a supplement by bodybuilders who want to reduce muscle breakdown and by athletes on vigorous training schedules who believe the supplement boosts their immune systems.

Preparations

As a protein, glutamine occurs naturally in some foods, including meat, fish, legumes, peanuts, eggs, tofu, and dairy products. It also is highly concentrated in raw cabbage and beets. Cooking can destroy glutamine, particularly in vegetables. Much of a person's glutamine needs, even when exercising hard, can come from food sources. A 3-oz. serving of meat contains about 3 to 4 g of glutamine.

Glutamine supplements come in several forms. Some manufacturers sell tablets that also contain vitamins. The most common forms of glutamine supplements are protein powders that can be added to liquids and prepared protein drinks and shakes. Another amino acid called alanine may be combined with glutamine. The combined protein supplement is called alanyl-glutamine. When glutamine is used for medical purposes in a hospital setting, it may be administered through a tube directly into the intestine.

Recommended doses of glutamine for fitness uses such as bodybuilding vary but generally are 8 to 20 g a day and average about 15 g a day. Cancer patients on glutamine therapy may take a higher dose, about 30 g per day. An average daily dose for the general public is 1.5 to 6 g.

Precautions

The powdered form of glutamine should be dissolved in a liquid and consumed quickly before it breaks down. Some literature recommends taking glutamine immediately before or after meals or at the same time as eating protein, usually twice per day.

Glutamine is marketed as a dietary supplement and, therefore, is not regulated in the same way as prescription drugs. The United States Food and Drug Administration (FDA) is the regulatory body responsible for regulating dietary supplements. Because supplements are regulated in the same way as food, and

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KEY TERMS

Digestive tract—The long tubular structure that handles all digestion and the structures that connect to it, including the mouth, esophagus, stomach, and intestines.

Goiter—An enlarged thyroid gland (a hormone-producing gland at the front of the neck). Goiters usually appear as obvious swelling in the neck.

Hypothyroidism—A condition that is characterized by decreased activity of the thyroid gland (a hormone-producing gland at the front of the neck) that often results in weight gain, tiredness, dry skin, and other symptoms.

Sepsis—A bacterial infection of the bloodstream or tissues of the body.

not as medicine, the products do not have to be proven safe or effective before being put on the market. Most FDA regulation of supplements involves only ensuring that false health claims are not made by the supplements. No supplement is allowed to claim that it treats or cures any disease or condition without undergoing scientific study and clinical trials to prove the statement is true. Individuals who take glutamine must be cautioned to carefully read product labels and the research on the products that are being considered. Investigations of dietary supplements have revealed discrepancies between the quantities of active ingredient present in the product and the quantity indicated as present on the label.

While many fitness promoters tout glutamine's effects, some researchers disagree with the science behind the claims. More and larger clinical trails may be able to clear up the controversy over glutamine's ability to increase muscle size and strength in recreational athletes.

Side effects

No side effects are generally reported with glutamine use; however, as of 2008 no significant scientific studies had been done to investigate possible side effects.

Interactions

Glutamine has not been shown to interact with any particular drugs or with other supplements. Before beginning to take glutamine individuals should talk to their physician, pharmacist, or other medical health professional. No significant scientific studies have been done to determine if glutamine negatively interacts with medications, other supplements, or herbs. A medical professional can help individuals determine if the supplement is likely to be safe for them. Consumption of cabbage can worsen goiters and a condition called **hypothyroidism**.

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ORGANIZATIONS

Center for Science in the Public Interest, 1875 Connecticut Ave. NW, Suite 300, Washington, DC, 20009, (202) 332-9110, http://www.cspinet.org.

National Center for Complimentary and Alternative Medicine, PO Box 7923, Gaithersburg, MD, 20898, (888) 644-6226, http://nccam.nih.gov.

Teresa G. Odle
Helen Davidson

Glutathione

Description

Glutathione is a tripeptide, a chemical compound consisting of three **amino acids**, cysteine, glycine, and glutamic acid. It is produced in the human liver and plays a key role in metabolism, immune response, and general health. The precise mechanisms of its biological functions are not, as of 2008, fully understood. Glutathione is also known as gamma-glutamylcysteineglycine and GHS. Glutathione occurs in two forms, a monomer consisting of a single molecule of the tripeptide and a dimmer consisting of two molecules joined through a disulfide bond. The monomer is sometimes called reduced glutathione, while the dimmer is also called oxidized glutathione. The monomer is the active

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form of glutathione. Oxidized glutathione is broken down to the single molecule by an enzyme called glutathione reductase.

Glutathione, in purified extracted form, is a white powder that is soluble in water and in alcohol. It is found naturally in many fruits, vegetables, and meats. However, absorption rates of glutathione from food sources in the human gastrointestinal tract are low.

General use

Glutathione was first isolated in yeast by English biochemist Sir Frederick Hopkins (1861–1947) in 1929. Its metabolism in the body was described in 1984, and its role in **cancer** treatment dates from 1984.

Glutathione is a major antioxidant highly active in human lungs and many other organ systems and tissues. It has many reported uses. It has a critical role in protecting cells from oxidative **stress** and maintaining the immune system. Higher blood levels of glutathione have been associated with better health in elderly people, but the exact association between glutathione and the **aging** process has not been determined.

Among the uses that have been reported for glutathione are:

- treatment of poisoning, particularly heavy metal poisons
- treatment of idiopathic pulmonary fibrosis
- increasing the effectiveness and reducing the toxicity of *cis-platinum*, a drug used to treat breast cancer
- treatment of Parkinson's disease
- lowering blood pressure in patients with diabetes
- increasing male sperm counts in humans and animals
- treatment of liver cancer
- treatment of sickle cell anemia

Claims made for glutathione include that it increases energy, improves concentration, slows aging, and protects the skin.

The importance of glutathione is generally recognized, although its specific functions and appropriate clinical use remain under study. Similarly, because ingested glutathione has little or no effect on intracellular glutathione levels, questions remained as of 2008 as to the optimal method for raising the intracellular levels.

In addition to studies ongoing in the late 2000s of the role of glutathione in cancer and cancer therapy, there were clinical trials of glutathione in the treatment of amyotrophic lateral sclerosis (ALS). The U.S. National Cancer Institute included glutathione in a study to determine whether nutritional factors can inhibit development of some types of cancer.

European researchers, with support from the Cystic Fibrosis Foundation, examined the potential uses of inhaled glutathione in cystic fibrosis. Some physicians also use inhaled glutathione in treating airway restriction and **asthma**. Other studies investigated whether administration of alpha-lipoic acid, a material that can elevate intracellular glutathione, may be beneficial in restoring the immune system in **AIDS** patients.

Preparations

Although glutathione is marketed as a nutritional supplement, it does not appear that glutathione supplements actually increase the levels of glutathione inside cells. In human studies, oral doses of glutathione had little effect in raising blood levels of the substance. Further, glutathione is so widely distributed in common foods that supplements are not normally required. Supplements of **vitamin C** are more effective at increasing intracellular glutathione than taking oral glutathione supplements. Oral supplements of whey protein and of alpha-lipoic acid appear to help restore intracellular levels of glutathione.

Glutathione is available as capsules of 50, 100, and 250 mg. It is also included in many multivitamin and multi-nutrient formulations.

Precautions

As of 2008, the only established precautions were sensitivity to any of the inactive ingredients in the preparations of glutathione or the products used to stimulate glutathione levels.

Side effects

There were no established side effects to glutathione or to the substances used to elevate glutathione levels.

Training and certification

Glutathione has been classified as an orphan drug for treatment of AIDS. For this purpose, medical licensure is required. Glutathione has been given intravenously for amelioration of the side effects of cisplatin therapy. Specific training is required to order, prepare, start, and monitor intravenous therapy. No specific training is required to use glutathione or the compounds that have been reported to raise glutathione levels for other purposes.

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KEY TERMS

Antioxidant—A substance, such as vitamin E, vitamin C, or beta carotene, thought to protect body cells from the damaging effects of oxidation.

Dimmer—A molecule consisting of two identical simpler molecules.

Heavy metal poison—A metal with a specific gravity greater than about 5.0, that is poisonous, such as lead or mercury.

Intracellular—Inside a cell.

Monomer—A molecule that can combine with others to form a dimmer or a polymer.

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Gluten-free diet

Definition

A gluten-free diet is a diet that is completely free of gluten, which is a generic term for storage proteins found in grains. In **celiac disease** (also referred to as celiac sprue), persons develop an inflammatory immune system response to gluten that results in damage to the small intestine, which inhibits absorption of nutrients. Some persons also develop **dermatitis** herpetiformis, an itchy and blistering skin condition. Because of gluten intolerance, affected persons must completely avoid foods that contain gluten.

Origins

Guidelines for this diet have been developed by dietitians for several organizations associated with celiac disease and dermatitis herpetiformis, including the Gluten Intolerance Group, the Celiac Sprue Association, and the Celiac Disease Foundation. The American Dietetic Association also sponsored the development of a gluten-free diet through a cooperative effort of dietitian experts in celiac disease in Canada and the United States, which was published in October, 2000.

Description

The gluten-free diet is the prescribed medical treatment for gluten intolerance diseases, including celiac disease and dermatitis herpetiformis. Celiac disease is a genetically inherited, chronic digestive disease that results in damage to parts of the small intestine that are responsible for absorption of nutrients. Celiac disease affects almost three million people in the United States, about one percent of the population. Celiac disease is found among North American and European populations, where wheat is a staple food, but is found infrequently among descendants of China and Japan and persons with an African-Caribbean background, where wheat is not as widely consumed.

In addition, dermatitis herpetiformis is an important disorder or complication of gluten-sensitive enteropathy, which is manifested in the form of a skin rash. Approximately 10% of persons with celiac disease have dermatitis herpetiformis, but about 85% of persons with dermatitis herpetiformis also have celiac disease.

When a person with celiac disease consumes gluten, the villi of the small intestine, where absorption of key nutrients takes place, become damaged, resulting in nutrients passing through the digestive system

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KEY TERMS

Antibodies—Any of numerous protein molecules produced by the immune system as a primary immune defense to destroy or neutralize foreign objects. Each antibody recognizes a specific target, referred to as the antigen. These antigens may include foreign proteins, microorganisms, or toxins. Some antibodies attack the body's own tissues.

Autoimmune disease—An illness that occurs when the body tissues are attacked by its own immune system.

Enteropathy—A disease of the intestinal tract.

Lymphoma—Any of various usually malignant tumors that arise in the lymph nodes or in other lymphoid tissue.

Osteomalacia—Softening of bone, particularly bone weakened by demineralization (loss of mineral) and most notably by the depletion of calcium from bone. Osteomalacia may be caused by poor dietary intake or poor absorption of calcium and other minerals needed to harden bones. Osteomalacia is a characteristic feature of vitamin D deficiency in adults.

Osteopenia—Mild thinning of the bone mass, but not as severe as osteoporosis. Osteopenia results when the formation of bone is not enough to offset normal bone loss. Osteopenia is generally considered the first step to osteoporosis.

Osteoporosis—A decrease in bone mass and bone density and an increased risk and/or incidence of fracture.

Tropical sprue—A condition of unknown cause whereby abnormalities in the lining of the small intestine prevent the body from absorbing food normally. This disease is not associated with gluten enteropathy. It has been associated with travel and residence in tropical areas.

Villi—The tiny, finger-like projections on the surface of the small intestine that help absorb nutrients.

without being absorbed. The person exhibits gastrointestinal distress and eventually malnutrition. In infancy, celiac disease manifests itself as failure to thrive, **diarrhea**, abdominal distention, developmental delay, and in some infants, as severe malnutrition.

After infancy, the symptoms of celiac disease are less dramatic. Older children may be short or exhibit dental enamel defects. Women comprise about 75% of newly diagnosed adult cases of celiac disease. Symptoms of celiac disease include diarrhea, **constipation** alternating with diarrhea, intestinal **gas**, fatty, greasy, foul-smelling stools, bloating, **nausea**, **vomiting**, skin irritation, weight loss, **anemia**, neurological effects (including seizures, and possibly migraine headaches), **fatigue**, concentration and memory problems. In some cases, there may be intestinal damage without significant gastrointestinal symptoms. Celiac disease is diagnosed by blood tests for certain antibodies and small intestine biopsy. A positive small intestine biopsy, followed by an improvement in health after following a gluten-free diet, is confirmation of celiac disease. A gluten-free diet should not be started before diagnosis is confirmed.

Some individuals may exhibit gluten intolerance, with gastrointestinal symptoms similar to those seen with celiac disease, but without its resulting intestinal damage. Gluten intolerance is diagnosed by following a gluten-free diet, followed by reintroduction of gluten- containing foods, to evaluate health improvement associated with elimination or reduction of gluten from the diet. Some individuals with gluten intolerance maybe be able to tolerate a low-gluten diet under the supervision of a physician or dietitian.

A gluten-free diet may also be helpful for persons with **multiple sclerosis** and other autoimmune disorders, as well as for persons with **autism** spectrum disorders, Attention Deficit Hyperactivity Disorder (ADHD), and some behavioral problems.

The foods of concern for individuals with, or susceptible to, celiac disease are the cereal grains that contain the storage proteins prolamin and glutelin (commonly referred to as glutens in wheat), all varieties of wheat (e.g., durum, spelt, kamut), barley (where the storage proteins are called hordiens), rye (where the storage proteins are called secalins), and their cross-bred hybrids (such as triticale).

Grains and starches that are allowed in a gluten-free diet include: rice, corn, soy, potato, sweet potato, tapioca, beans, garfava, sorghum, quinoa, millet, **arrowroot**, amaranth, tef, nut flours, and buckwheat. However, some commercial buckwheat products are mixtures of wheat and buckwheat flours and should be avoided. Other foods that are allowed (only a partial list) include fresh, canned, and frozen fruit or fruit juices, fresh vegetables, canned and frozen vegetables without gluten-containing additives, milk, aged cheese, all unprocessed meats, poultry, fish, eggs, dried beans, nuts, and seeds. A dietitian should be consulted to develop and monitor a gluten-free diet.

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Gluten-free foods can be found in health food stores, through mail order sources, and in some supermarkets. Cookbooks are available to help in food preparation. Many food manufacturers maintain lists of gluten-free products. The Gluten-Free Certification Organization (GFCO) of the Gluten Intolerance Group, in cooperation with the Food Services, Inc., a subsidiary of the Orthodox Union, a kosher certification agency, has developed a gluten-free certification program. This program benefits consumers by giving them confidence that a product is gluten-free through a process whereby products have been tested and the manufacturing site inspected. The program also saves the consumer time that would have been spent calling the manufacturer for the gluten-free status of the product. Certification is a yearly process based on ingredient review, on-site inspection and product testing. The Celiac Sprue Association (CSA) also has the CSA Recognition Seal Program that certifies gluten-free products. Requirements for obtaining the CSA Seal for products include:

- ingredient review and verification by testing to assure products are free of wheat, barley, rye and oats
- provision of written facility procedures and on-site facility audits to assure that procedures are in place to control any cross or outside contamination in processing and packaging

Foods may contain gluten, although gluten will not be indicated on the ingredient list, because it was not included in the formulation of the product. For example, a conveyer belt may be dusted with a gluten-containing material to prevent foods from sticking and may contaminate the finished food product.

Function

The gluten-free diet is used by persons who are gluten-sensitive to prevent damage to their small intestines and to prevent serious complications such as gastrointestinal cancers, iron-deficiency anemia, and decreased bone mineral density.

Benefits

A gluten-free diet has been shown to greatly reduce the risk for **cancer** and overall mortality for individuals with symptomatic celiac disease.

For many people with celiac disease, following a gluten-free diet will stop the symptoms of the disease and result in improved health, usually within several months (for some persons, recovery may take up to one year). However, the health of some people with extensive damage to their small intestines may not improve. Refractory celiac disease (RCD) is a rare syndrome with a poor prognosis, defined by malabsorption due to gluten-related enteropathy after initial or subsequent failure of a strict gluten-free diet and after exclusion of any other disease or disorder mimicking celiac disease. Other treatments may be necessary to treat the RCD, such as the use of corticosteroids and immunosuppressant drugs, but data on their effectiveness is lacking.

Precautions

In addition to gluten-containing grains, gluten can be found in a large variety of foods including soups, salad dressings, processed foods, candy, imitation bacon and seafood, marinades, processed luncheon meats, sauces and gravies, self-basting poultry, soy sauce or soy sauce solids, thickeners, communion wafers, and natural flavorings. Unidentified starch, binders and fillers in medications, supplements, or vitamins and adhesives in stamps and stickers can also be unsuspected sources of gluten. Playdough, which contains wheat, can be harmful if hands are put on or in the mouth after contact or hands are not washed after play.

An individual following a gluten-free diet must read labels every time a food item is purchased or consumed. Ingredients that may contain hidden sources of gluten include unidentified starch, modified food starch, hydrolyzed vegetable or plant protein (HVP or HPP), texturized vegetable protein (TVP), and binders, fillers, and extenders. In addition, manufacturers can change ingredients at any time, and a product may no longer be gluten-free. Ingredients may be verified by contacting a manufacturer and specifying the ingredient and lot number of a food item. If a person cannot verify ingredients in a food product or if the ingredient list is unavailable, the food should not be eaten, to avoid damage to the small intestine that occurs every time gluten is consumed.

Gluten-free recommendations can be difficult to follow. It is recommended that an affected person keeps the diet simple at the beginning by eating fresh fruits and vegetables, milk, unprocessed protein foods such as fresh beef, pork, poultry, fish, and eggs, natural nuts, seeds, and vegetable oils without additives.

Pure, uncontaminated oats eaten in moderation (one cup cooked daily) may be safe for persons with celiac disease. However, in many cases oats can become cross-contaminated with grains containing gluten during growth, harvest, transport, storage, or processing. Some persons with celiac disease who introduce oats to their diet may experience abdominal discomfort, gas, and stool changes until they become

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accustomed to the increased fiber levels from the oats. Others with celiac disease may exhibit a hypersensitivity to oats and should avoid their consumption. Recent research published between 2000 and 2004 has indicated that oats may contain a protein similar to gluten that has caused intestinal inflammation in many persons with celiac disease. At this time, because of conflicting information on the effects of oats on persons with celiac disease, excluding oats from the diet may be the best and most risk-free choice. In all cases, persons with celiac disease should consult their health care provider or dietitian before including oats in their diet and should have their antibody levels monitored regularly.

Almost all beers are brewed with barley (some are brewed with wheat) and should not be consumed by a person following a gluten-free diet. Sorghum and buckwheat beers are available but are a specialty product. Most distilled forms of alcohol are gluten-free, unless additives and colorings have been added, which may contain glutens. Wines are also usually gluten-free.

Since celiac disease is an inherited autoimmune disease, screening of family members is recommended. The chances of developing gluten-sensitive enteropathy increases to 10 to 20% in persons who have a first-degree relative with celiac disease. Celiac disease is also associated with other autoimmune syndromes such as Type 1 diabetes.

Risks

A gluten-free diet is difficult to follow, and continued health problems are usually associated with problems adhering to the gluten-free diet. A person can exhibit celiac-related symptoms for months after a single gluten intake. Persons with gluten-sensitivity who do not treat their disease are at a higher risk for enteropathy-associated T-cell lymphoma and other gastrointestinal cancers. However, the maintenance of a long-term gluten-free state reduces the risk of lymphoma to the level seen in the general population. Other complications of gluten-sensitivity include decreased mineral bone density and iron-deficiency. Persons with celiac disease and dermatitis herpetiformis must maintain a gluten-free diet for the rest of their lives, for these diseases cannot be cured.

Persons are more likely to adhere to the diet if a dietitian and support group are involved. If a person is not responding well to a gluten-free diet, the doctor should:

- investigate whether the initial diagnosis of celiac disease was correct
- check for other conditions that can be causing symptoms, such as pancreatic insufficiency, irritable bowel syndrome, bacterial overgrowth, lymphocytic colitis, T-cell lymphoma, fructose intolerance, or tropical sprue
- refer the person to a dietician to check for errors in the diet or for compliance with the diet

To monitor dietary adherence to the gluten-free diet, the dietitian will examine the person's dietary history and habits. Blood tests will be conducted to see if gluten antibody levels have returned to normal levels. If there is clinical concern that a person is not adhering to the gluten-free diet or that the diet is not effective, a biopsy of the small intestine may be conducted.

The gluten-free diet is complex and it cannot be assumed that chefs in restaurants or others who prepare food (including friends and family) are aware of potential sources of gluten contamination. Education of family and friends is important in accomplishing a lifestyle change. In restaurants, simple dishes without sauces should be ordered, and the person should inquire whether grain products are prepared with the same equipment or utensils used to prepare other foods. Although a food may be considered to be gluten-free by the ingredients it contains, it may be gluten-contaminated by the way in which it is prepared or stored. Other difficulties associated with following a gluten-free diet include lifestyle changes such as avoiding travel, finding gluten-free foods (especially those of good quality), determining whether foods are gluten-free, not being invited out because of the diet, with resulting social isolation, and maintaining a gluten-free diet when in the hospital.

As with any restrictive diet, the gluten-free diet has potential for nutritional inadequacy. Persons who are sensitive to gluten are at increased risk for **osteoporosis** and osteomalacia, due to malabsorption of **calcium** and **vitamin D**. Most persons with celiac disease have some degree of osteopenia or osteoporosis. Calcium and vitamin D supplementation along with strict adherence to a gluten-free diet usually results in remineralization of the skeleton. **Iron** or other vitamin deficiencies may also be present and must be treated appropriately. The consumption of gluten-free fiber-rich foods (for example, brown rice, fruits, and vegetables) and adequate fluid intake is recommended to assist in the prevention of constipation.

Women with untreated celiac disease often exhibit a history of miscarriages, anaemia, low birth weight babies, and unfavorable outcome of **pregnancy**. It is suggested that testing for celiac disease be included in

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the battery of tests prescribed for pregnant women. Celiac disease is considerably more common than most of the diseases for which pregnant women are routinely screened. Unfavorable events associated with celiac disease may be prevented by a gluten-free diet.

Research and general acceptance

The gluten-free diet is recognized as the required treatment for persons exhibiting gluten-sensitivity.

The National Institutes of Health noted in 2004 that the strict definition of a gluten-free diet remains controversial due to the lack of an accurate method to detect gluten in food products and the lack of scientific evidence for what constitutes a safe amount of gluten ingestion. No international agreement has yet been developed on how much gluten a person with gluten-sensitivity can tolerate. Research is on-going to better identify levels that are acceptable, and health professionals involved in the therapy of celiac disease should keep up-to-date on the latest research. As of 2007, the United States Food and Drug Administration is proposing to set a standard of 20 part per million as the maximum acceptable level of gluten allowed for a product to be labeled as gluten-free.

Research continues on the benefits of a gluten-free diet for persons with multiple sclerosis and other autoimmune disorders, as well as for persons with autism spectrum disorders, ADHD, and some behavioral problems.

In addition, a new enzyme that was being developed for commercial food processing has been found to break down gluten molecules quickly and almost completely. The enzyme is made from *Aspergillis niger*, a common fungus that is the source of other food grade enzymes already being manufactured for human consumption. Fritz Koning of Leiden University Medical Center in the Netherlands is leading the research. He stated that if the enzyme proves itself in clinical trials to eliminate the need for a gluten-free diet, it could be mass produced at a reasonable cost.

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ORGANIZATIONS

Celiac Disease Foundation, 13251 Ventura Boulevard, Suite 1, Studio City, CA, 91604-1838, (818) 990-2354, http://www.celiac.org.

Celiac Sprue Association, P.O. Box 3170, Omaha, NE, 68131-0700, (877) 272-4272, celiacs@csaceliacs.org, http://www.csaceliacs.org.

Gluten Intolerance Group, 31214 124th Avenue SE, Auburn, WA, 98092-3667, (253) 883-6655, http://www.gluten.net.

Gluten-Free Living, http://www.glutenfreeliving.com.

The University of Maryland Center for Celiac Research, 20 Penn Street, Room S303B, Baltimore, MD, 21201.

University of Maryland Medical Center, 22 S. Greene Street (N5W40), Baltimore, MD, 21201, (410) 328-6749, (800) 492-5538., http://www.celiaccenter.org/.

Judith L. Sims

Goatweed *see* **St. John's wort**

Goldenrod

Description

Averaging about 4 feet (1.2 m) in height, goldenrod is a perennial with clusters of bright yellow flowers. It has been used for centuries in the treatment of **kidney stones**, urinary tract **infections**, and a variety of other medical conditions. One legend has it that a 10-year-old boy who received an infusion of goldenrod for several months in the late eighteenth century passed 50 gravel stones larger than a pea. Native Americans used goldenrod to alleviate **sore throat**,

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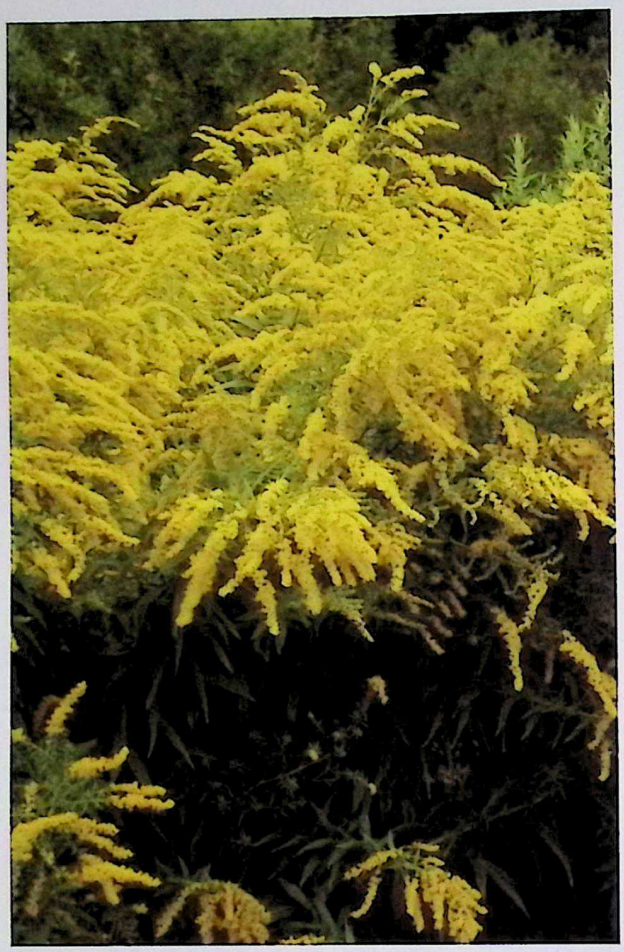

Rough-leaf goldenrod. *(© Arco Images / Alamy)*

and blue mountain tea made from goldenrod leaves is sometimes used to combat **fatigue** in the Appalachian Mountains. Goldenrod varieties belong to the plant family Asteraceae. While European goldenrod (*Solidago virgaurea*) is perhaps the most well known variety, other species of the plant (there are over 100 and counting) appear to have roughly equivalent medicinal properties—in particular, the ability to increase the flow of urine. In Europe, *Solidago virgaurea* is often used interchangeably with other species of goldenrod such as *Solidago serotina* and *Solidago canadensis* in the drug of commerce. Only the aboveground parts of the plant, mainly the flowers and leaves, are considered to have medicinal value.

Goldenrod grows in Europe, Asia, northern Africa, and North America, but most medicinal goldenrod originates in Bulgaria, Hungary, Poland, and other eastern European countries. It thrives in a wide variety of habitats, including hills, woods, meadows, and rocky terrain. Contrary to popular belief, goldenrod does not play a significant role in triggering **hay fever** reactions. This myth probably developed due to the fact that goldenrod blooms around the same time and in the same places as the ragweed responsible for most seasonal **allergies**. Studies of goldenrod pollen indicate that it is not a potent allergen for most people. Goldenrod is also a very potent anti-allergic herb for people with hay **fever**.

The genus name *Solidago* is derived from the Latin verb *solidare*, which can be translated "to make whole." Goldenrod received this appellation due to its reputation through the ages as a wound-healing drug. This also explains why goldenrod has sometimes been referred to as "woundwort" during its long history as a folk remedy. While not valued much today as a wound healer, goldenrod has been approved by the authoritative German Commission E as a diuretic, anti-inflammatory, and antispasmodic for the treatment of urinary tract disorders. Research suggests that goldenrod can increase the production of urine, which is often helpful in cases of urinary tract infection or kidney stones, without reducing levels of important electrolytes, such as **sodium** and chloride, the way that some man-made diuretics do. While it is not known exactly how goldenrod produces its therapeutic effects, researchers have focused on several naturally occurring chemicals in the plant. Most experts believe that goldenrod's ability to increase urine production is due to the presence of flavonoids and saponins, which stimulate the kidneys to release fluid. Another chemical in goldenrod, a phenolic glycoside called leiocarposide, may be responsible for goldenrod's anti-inflammatory effects. In one study of *Solidago virgaurea* involving rodents, researchers from Cairo University found that the anti-inflammatory activity of goldenrod was comparable to that of diclofenac, a nonsteroidal anti-inflammatory drug (NSAID) prescribed for conditions such as **rheumatoid arthritis**. The tannins in goldenrod have been associated with astringent properties. The herb also contains a small amount of essential oil.

General use

While not yet popular in the United States or approved for use by the United States Food and Drug Administration (FDA), goldenrod is used widely in Europe to treat urinary tract infections and help eliminate kidney or bladder stones. The Commission E has approved goldenrod as flushing-out therapy for inflammatory diseases of the lower urinary tract and for helping to eliminate and prevent stones. Goldenrod is considered useful in treating these disorders for several reasons. The herb can help to eliminate bacteria and stones by increasing the flow of urine and thereby "washing" them out. As an anti-inflammatory and

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KEY TERMS

Antispasmodic—An agent with the ability to prevent or relieve convulsions or muscle spasms.

Astringent—An agent that helps to contract tissue and prevent the secretion of internal body fluids such as blood or mucus. Astringents are typically used to treat external wounds or to prevent bleeding from the nose or throat.

Diuretic—An agent that increases the production of urine.

Edema—Abnormal swelling of tissue due to fluid buildup. Edema, which typically occurs in the legs, liver, and lungs, is often a complication of heart or kidney problems.

Electrolytes—Substances in the blood, such as sodium and potassium, that help to regulate fluid balance in the body.

antispasmodic, goldenrod may help to soothe irritated tissue in the urinary tract and prevent **muscle spasms**.

Goldenrod is not used as a cure for any of these disorders—for example, antibiotics are considered the primary therapy in cases of urinary tract infections—but it can be a helpful component of treatment. In Germany, where goldenrod has government approval as an aid in treating urinary tract disorders, the plant is often combined with java tea leaf, birch leaf, or **uva ursi** leaf. Compared to other herbal diuretics, goldenrod is considered well tolerated due to its lack of side effects and contraindications.

Throughout its history, goldenrod has been used to treat a variety of other medical problems. These include **hemorrhoids**, diabetes, **tuberculosis**, liver enlargement, **gout**, internal bleeding, **diarrhea**, **asthma**, rheumatism, enlarged prostate, infections of the mouth and throat, and external **wounds**. In the Appalachian Mountain region of the United States, goldenrod leaves have been used to prepare blue mountain tea, which is recommended by folk practitioners there to combat fatigue and physical exhaustion. Sufficient scientific evidence to support these additional uses is lacking.

Preparations

Dosage of goldenrod generally ranges from 6–12 g of cut herb per day. The drug, which is recommended for internal use only, can be taken as a tea, liquid extract, or tincture. No matter which preparation is used, it is important to drink plenty of fluids (6–8 glasses a day) while using goldenrod in order to increase its effectiveness as a diuretic.

Goldenrod tea can be prepared by steeping 3–5 g (1 or 2 teaspoonfuls) of the herb in 150 ml of simmering water. The mixture should be strained after about 15 minutes. Dosage is two to four cups of tea a day, taken between meals. The liquid extract preparation is usually taken two to three times a day in doses of 0.5–2.0 ml. Dosage for the tincture is 0.5–1.0 ml two to three times a day.

Precautions

While self-care measures such as goldenrod may be an effective component of treatment for disorders of the urinary tract, these medical conditions can be serious and require consultation with a doctor. People who have **edema** due to reduced heart or kidney function should not use goldenrod without medical supervision. Due to lack of sufficient medical study, goldenrod should be used with caution in children, women who are pregnant or breastfeeding, and people with kidney disease. To ensure optimum effectiveness, protect goldenrod from direct sunlight and moisture during storage.

Most studies of goldenrod's effects as a diuretic, anti-inflammatory, and antispasmodic have been conducted in the test tube or in rodents. Goldenrod's effectiveness in humans is not well demonstrated.

Side effects

When taken in recommended dosages, goldenrod has not been associated with any significant or bothersome side effects. Allergic reactions may occur in some people.

Interactions

No drugs are known to interact adversely with goldenrod. In Germany, goldenrod has been combined with java tea leaf, birch leaf, and uva ursi leaf without apparent harm.

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ORGANIZATIONS

American Botanical Council. P.O. Box 144345, Austin, TX 78714-4345.

Herb Research Foundation. 1007 Pearl Street, Suite 200, Boulder, CO 80302.

OTHER

Herb Research Foundation. http://www.herbs.org.

OnHealth. http://www.onhealth.com.

Discovery Health. http://www.discoveryhealth.com.

Greg Annussek

Goldenseal

Description

Goldenseal (*Hydrastis canadensis*) is a perennial North American native plant found wild in eastern deciduous woodlands and damp meadows as far north as Vermont and Minnesota, and south to Georgia and Arkansas. This versatile herb is sought for its valuable rootstock and inner twig bark. Goldenseal is a member of the Ranunculaceae, or buttercup family. It is a mainstay of **Native American medicine**, and a popular folk remedy. Goldenseal has multiple uses, both internally and externally. It is sometimes called poor man's ginseng. This traditional medicinal herb has been known by many names, including yellow paint root, orange root, eye root, Indian plant, tumeric root, eye balm, jaundice root, yellow puccoon, and ground raspberry. Native American tribes valued this natural antiseptic herb for many medicinal uses and as a clothing dye. Early colonists soon came to appreciate its infection-fighting action. The Native American use of goldenseal as a **cancer** treatment was first mentioned in the herbal, *Essays Toward a Materia Medica of the United States* first published by Benjamin Smith Barton in 1798.

The yellow rootstock is the main, known medicinal part of the herb. In cultivation, goldenseal requires up to four years growth before the rootstock is ready for harvest. The thick and knotty rhizome produces a hairy stem that grows to 2 ft (61 cm) high. Goldenseal has only two large leaves, each five-lobed with double-toothed edges growing atop a forked stem. Leaves are serrated at the top edges. A single flower with greenish-white sepals crowns the hairy stem. The fruit looks like a **raspberry**, hence one of the plant's common names. Pharmaceutical companies harvest goldenseal root in large quantities for use. The herb is fully endangered on extinction risk lists in the wild due to over-collection of the rhizome. An estimated 250,000 lbs (113,400 kg) of rootstock of this popular herbal remedy are sold each year, and most of this has been collected in the wild.

General use

The underground portion of the stem, called the rhizome, as well as the inner twig bark, are the medicinal part of this multiple-use native remedy. The goldenseal rhizome is rich in alkaloids: hydrastine, berberine, and canadine, in addition to other phytochemicals, oils, and resin. Goldenseal has been considered a cure-all medicinal herb because of its wide variety of medicinal applications. It is a bitter herb that is effective when taken internally to promote digestion. The herb is particularly helpful when used to treat inflammation and infection of the mucous membranes lining the upper respiratory tract, and the digestive and genitourinary tract. Its anti-bacterial properties improve all catarrhal conditions, and it is helpful against amoebic infection. Goldenseal potentiates insulin and stimulates liver, kidney, and lung function. The astringent herb may also be used to help control bleeding, so it is helpful in circumstances of excessive and painful **menstruation** or postpartum hemorrhage. It is antiseptic, diuretic, and acts as a mild laxative and internal body cleanser. Goldenseal is used in treatment of peptic ulcers, and stimulates the flow of bile. Applied externally as rhizome bark powder or tincture, the herbal preparations can help treat **gum disease**, vaginal infection, **eczema**, **impetigo**, **conjunctivitis**, inflammations of the ear, and possibly ringworm. Its diuretic and anti-inflammatory effects can help lower blood pressure. The berberine alkaloid in goldenseal stimulates uterine contractions, and the herb is useful to treat **pelvic inflammatory disease** (PID). Goldenseal is high in **iron**, **manganese**, silicon, and other minerals. Goldenseal was once considered a good substitute for quinine. The herb has been used as a remedy for diphtheria, **tonsillitis**, chronic catarrh of the intestines, typhoid **fever**, **gonorrhea**, leucorrea, and **syphilis**. It is no wonder that with all these medicinal benefits, this herb is disappearing in the wild.

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Preparations

The rootstock of goldenseal, harvested in spring or fall in the third or fourth year of growth, can be used in decoction, liquid extract, tablet, and tincture. When purchasing commercially prepared remedies, avoid the wild-crafted sources to help protect this valuable herb in its wild habitat.

To prepare an eyewash of goldenseal, mix equal parts of powdered rootstock and boric acid with boiling hot water. Stir well and allow to cool. Strain the mixture and store in a dark glass container. For one dosage, retrieve 1 tsp of the resulting liquid per 1/2c water as a soothing eyewash solution. It is important to keep all equipment totally sterile, apply with a sterilized eyedropper, and discard old liquid eyewash (over 1–2 days).

For an infusion, use 1 tsp of powdered rootstock to a pint of boiling water. Let stand until cold. Dosage is 1–2 tsp, three to six times per day, for up to seven days. The infusion may also be used as a gargle.

To prepare a tincture, combine one part fresh herb to three parts alcohol (50% alcohol/water solution) in glass container. Set aside in dark place. Shake daily for two weeks. Strain through muslin or cheesecloth, and store in dark bottle. The tincture should maintain potency for two years. Standard dosage, unless otherwise prescribed, is 1 tsp, three times daily, for short periods (1–2 weeks).

To make capsules, pulverize the dried root into a fine powder. Place in gelatin capsules. Dosage is two capsules, three times daily for three weeks, then discontinue for the next three weeks.

Precautions

Pregnant and breastfeeding women should not use this herb as it may stimulate uterine contraction. Patients with high blood pressure should also avoid goldenseal. The herb should be taken only for very limited periods, as it builds up in the mucosa of the system and its strong alkaloids are neurotoxic over an extended time (i.e., several months of daily use). Three weeks on and three weeks off is a good routine for dosage. Do not eat the plant fresh, as it can irritate mucous tissues.

Side effects

Goldenseal use can destroy organisms that are beneficial to the body, as well as those that are pathological. It should be used only for limited periods of time.

Interactions

Goldenseal is often combined with other herbs in preparations. **Myrrh** gum (*Commiphora myrrha*) and **echinacea** (*Echinacea augustifolia*) extract may be added to goldenseal in salve preparations. Goldenseal combines well with **mullein** (*Verbascum thapus*) for **earache**, and with **chamomile** (*Matricaria chamomilla*) and meadowsweet (*Filipendula ulmaria*) for stomach aches. Combine in infusion with **gotu kola** (*Centella asiatica*) for a brain tonic.

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Clare Hanrahan

Gonorrhea

Definition

Gonorrhea is a highly contagious sexually transmitted disease (STD) caused by the *Neisseria gonorrhoeae* bacterium. The genitourinary tract is the main system that is usually affected, but gonorrhea can also spread to the rectum, the throat, and the eyes. Left untreated, gonorrhea can spread through the bloodstream and infect the brain, heart valves, joints, and the reproductive system. Exposure to an infected mother during birth may cause permanent blindness in the newborn.

Description

Gonorrhea, commonly referred to as "the clap," is the second most prevalent reportable disease in the United States. Adolescents and young adults are in

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the highest risk category, with more than 80% of gonorrhea cases affecting the 15–29 year-old age group. Individuals living in urban areas who have multiple sex partners have the highest risk of contracting the disease. Still, the incidence of gonorrhea steadily declined after 1987. This trend appeared to be largely due to increased public awareness about the risks and prevention of contracting STDs such as herpes and HIV. However, in a report on sexually transmitted diseases (2007), the Centers for Disease Control (CDC) expressed concern about rising rates of gonorrhea in certain urban areas during preceding years. The CDC reported that 358,366 new cases of gonorrhea were diagnosed in 2006. Experts believe that the true number of cases of gonorrhea is much greater than this number, however, because many people do not see a health specialist for treatment of the disease.

Causes and symptoms

Gonorrhea is transmitted efficiently. It can be spread merely by coming into contact with the fluids of an infected person as well as by sexual contact. A person runs a 60–90% chance of contracting the disease after just one sexual encounter with an infected person. The symptoms usually begin between one day and two weeks after the initial encounter with the infection.

People who are infected with gonorrhea commonly experience increasingly frequent and painful urination, and the urethra may be painful and swollen. There may be a thick white, yellowish, or bloody discharge from the penis or vagina. Other symptoms may include **nausea**, **vomiting**, **fever**, **chills**, and **pain** during intercourse. In the case of oral infection, there may be a **sore throat** or pain during swallowing. An anal infection may cause rectal **itching**, rectal discharge, and a constant urge to move the bowels. Women who show symptoms of gonorrhea often have abdominal pain and breakthrough bleeding (spotting) between menstrual periods. However, many women who have gonorrhea experience no symptoms.

In infants and children, irritation, redness, swelling with a pus-like discharge, and possibly pain and a change in urination may point to a gonorrhea infection. The infection may be due to child abuse or exposure to infected materials. An in-depth history should be taken if gonorrhea is suspected.

Diagnosis

The initial diagnosis of gonorrhea is based on symptoms, sexual history, and at-risk behavior. One laboratory test for diagnosis involves the observation of a gram-stained sample of the discharge under a microscope. In the gram stain test, the sample is dyed, washed with various solutions, and dyed with a different color. The final color identifies the class of bacteria present in the sample. The advantage of this test is that results can be obtained very quickly so that treatment can commence at the initial visit. In the vast majority of men, it is quite accurate; however, the test is not very accurate for women.

For all women and for men with a questionable gram-stain reading, samples of the discharge from the infected area can be collected and cultured. The sample is incubated for up to two days, which provides enough time for the bacteria to multiply and be accurately identified. This test is highly accurate and specific for gonorrhea, but improper handling can lead to a false-negative reading. Other tests that are also used include the ELISA (enzyme-linked immunosorbent assay) antibody test and DNA probe testing of genetic material from the discharge, both of which are quite accurate in identifying *Neisseria gonorrhoeae*.

Treatment

Although there is nothing that can totally replace antibiotics in the treatment of gonorrhea, certain herbs and minerals may be used to supplement the treatment. These may be used to improve the body's immune function: **zinc**, multivitamins and mineral complexes, **vitamin C**, and **garlic** (*Allium sativum*). *Lactobacillus acidophilus* in supplements and live-culture yogurts help replenish gastrointestinal flora that may be destroyed by the intake of antibiotics.

Several herbs may reduce symptoms and help speed healing. These include **kelp** (*Macrocystis pyrifera* and related species), *Calendula officinalis*, **myrrh** (*Commiphora molmol*), and *Thuja occidentalis*. These herbs can be taken by the mouth or used as a douche. The Chinese herb *Coptis chinensis*, used for damp-heat **infections**, is helpful in treating the genitourinary tract, especially if **pelvic inflammatory disease** (PID) develops. An herbalist should be consulted to make recommendations for further complications. Some recommend a three-day cleansing fast to quicken and support healing. **Fasting** should be done only with the approval and supervision of a physician. Referral to an acupuncturist is also recommended, as there may be **acupressure** and **acupuncture** points that will help with system cleansing.

Allopathic treatment

For many years, the most effective treatment for gonorrhea was one of two antibiotics: penicillin, or one

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of its derivatives, and tetracycline. Over time, the *Neisseria gonorrhoeae* bacterium became significantly more resistant to these drugs, and other treatments were developed. In the late 2000s the most popular of those treatments were two broad-spectrum cephalosporins (ceftriaxone and cefixime), and three fluoroquinolones (ciprofloxacin, ofloxacin, and levofloxacin). In its 2006 report on drug-resistant gonorrhea, the CDC reported that approximately 15% of all cases of gonorrhea are resistant to treatment by penicillin and tetracycline, and new **strains** of the bacterium resistant to the fluoroquinolones have also begun to develop. The treatment of gonorrhea continued to be an on-going challenge for researchers and medical workers.

Since other STDs, such as **chlamydia** and **syphilis**, often occur with gonorrhea, patients may also be tested and treated for these related infections. Patients should refrain from sexual intercourse until treatment is complete and should return for follow-up testing. Anyone with whom the patient has had sexual contact during the time of infection should be notified and treated, even if those persons do not show symptoms. Doctors are required to report this disease to public health officials.

More than one healthcare provider may have to be consulted. Physicians trained in obstetrics or gynecology may be involved if gynecological complications occur. Men who experience complications may be referred to a urologist. There are also infectious disease doctors who specialize in the treatment of STDs.

Expected results

The prognosis for patients with gonorrhea varies based on how early the disease is detected and treated. Patients who are treated early and properly can be entirely cured of the disease. The most common complication is pelvic inflammatory disease (PID). PID can occur in up to 40% of women with gonorrhea and may result in damage to the fallopian tubes, an ectopic **pregnancy**, or sterility. If an infected woman is pregnant, gonorrhea can be passed on to the eyes of the newborn during delivery, which can lead to infection and blindness.

Although the risk of **infertility** due to gonorrhea is higher in women than in men, men may also become sterile if urethritis (inflammation of the urethra) develops. Complications of gonorrhea can affect the prostate, testicles, and surrounding glands as well. In either gender, inflammation, abscesses, and scarring can occur. In approximately 2% of patients with untreated gonorrhea, the infection may spread throughout the body and can cause fever, arthritis-like joint pain, and skin lesions.

KEY TERMS

Chlamydia—The most common bacterial sexually transmitted disease in the United States.

Ectopic pregnancy—A pregnancy that occurs outside the uterus, often in the fallopian tubes. The fetus will not survive, and in some cases, the pregnancy can result in the death of the mother.

False-negative—A laboratory result that does not detect the presence of a disease that is actually present.

Pelvic inflammatory disease (PID)—An infection of the upper genital tract.

Sexually transmitted diseases (STDs)—A group of diseases that are transmitted by sexual contact. In addition to gonorrhea, this group generally includes chlamydia, HIV (AIDS), genital herpes, genital warts, and syphilis.

Urethra—The canal leading from the bladder, and in men, also a path for semen.

Urethritis—Inflammation of the urethra.

Prevention

As of 2008, there was no vaccine for gonorrhea. The best prevention is to abstain from having sex or to engage in sex only when in a monogamous relationship in which both partners have been tested for STDs. The next line of defense against gonorrhea is the use of condoms, which have been shown to be highly effective in preventing this disease. The use of a diaphragm can also reduce the risk of infection. Since the risk of contracting gonorrhea increases with the number of sexual partners, those who have sexual contact with more than one partner are advised to be tested regularly for gonorrhea and other STDs.

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American Social Health Association, PO Box 13827, Research Triangle Park, NC, 27709, (919) 361-8400, http://www.ashastd.org.

Centers for Disease Control and Prevention, 1600 Clifton Rd., Atlanta, GA, 30333, (800) 311-3435, http://www.cdc.gov/.

Patience Paradox
Teresa G. Odle
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Gotu kola

Description

Gotu kola (*Centella asiatica*) is a member of the Apiaceae carrot family. It is also called pennywort, marsh penny, water pennywort, and sheep rot. The name sheep rot comes from the erroneous belief in Europe that gotu kola caused foot rot in sheep. Gotu kola is often mistaken for the **kola nut** plant (*Cola nitida*). However, the two are not related and gotu kola, unlike the kola nut, contains no **caffeine**. Gotu kola is noted in India as a very powerful spiritual herb, and **Ayurvedic medicine** refers to it as *Brahmi* because it helps obtain knowledge of the spiritual being.

Gotu kola, a perennial, grows in India, Sri Lanka, Madagascar, South Africa, China, Indonesia, Australia, and North America. It can grow like a weed, but its description depends on its location. For example, in shallow water, the leaves float; but in dry areas, the plant develops many roots and thin, tiny leaves. The fan-shaped leaves may be smooth or lobed. Red flowers turn into fruit with a diameter of about 0.2 in (5 mm).

Gotu kola's main active components are triterpenoids, although the gotu kola found in India, Sri Lanka, and Madagascar does not have the same properties. Gotu kola's triterpenes can have a concentration from 1.1-8%, with most concentrations in the middle range.

Gotu kola from Madagascar is used for most standardized extracts, and its four main triterpene properties are:

- asiatic acid (29-30%)
- madecassic acid (29-30%)
- asiaticoside (40%)
- madecassoside (1-2%)

Gotu kola also contains the following:

- volatile oil of a terpene acetate (36% of all the volatile oil)
- camphor
- cineole
- glycerides of some fatty acids
- plant sterols (campesterol, stigmasterol, sitosterol)
- polyacetylene compounds
- flavonoids (kampferol, quercetin)
- myo-inositol (glycoside from the flavonoids)
- sugars
- vellarin
- amino acids
- resins

General use

Traditional use of gotu kola in India and Indonesia included wound treatment. In the 1800s, it became part of Indian medicine practice and was used to treat many skin conditions including leprosy, varicose ulcers, and **eczema**, as well as **fever**, **diarrhea**, and absence of menses.

Chinese medicine uses various parts of the plant. The leaves are used for leukorrhea and fevers that are toxic, while other types of fevers and **boils** are treated with gotu kola shoots. Gotu kola used for longevity has become very popular. Chinese herbalist, Li Ching Yun, is supposed to have lived 256 years from drinking a herbal mixture containing gotu kola. An ancient Sinhalese saying, "Two leaves a day will keep old age

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Gotu kola. *(©PlantaPhile, Germany. Reproduced by permission.)*

away," also illustrates gotu kola's popularity as an agent for longevity.

The plant enhances brain and peripheral circulation, and is said to enhance memory. In the 1880s, the French began using gotu kola as part of regular pharmaceutical medicines.

Many current uses are similar to traditional uses of the plant. In a 1992 study at Kasturba Medical College, researchers fed rats gotu kola extract. After 14 days, the gotu kola-treated rats showed 3-60 times better retention of learned behavior than did rats who did not receive the extract.

Gotu kola may also play a role in fighting **Alzheimer's disease**, which affects over four million people in the United States. People with this dementia-causing disease have unusual amounts of the protein beta-amyloid (also called plaque) in the brain. A 1999 study conducted by pathology professor Alan Snow at Seattle's University of Washington showed gotu kola's potential for treatment. Snow first mixed a compound from **cat's claw** and tested it in rats and in test tubes. Results showed that cat's claw intervenes with plaque formation. When other extracts were added to the test tubes, including gotu kola and **rosemary**, the results were more pronounced.

Besides its use as a general memory aid, gotu kola has become popular in the Western world for its calming effects as well as for improving concentration. This duality occurs because gotu kola affects both the central nervous system and the brain. It relaxes the nervous system while stimulating the brain to focus better. In a 1999 study at the West Palm Beach Veterans Affairs Medical Center, researchers tested several dietary supplements, including gotu kola, for use in **depression**, **anxiety**, and **sleep disorders**. Researchers found little difference in the results of the natural supplements and low- and high-dose antidepressants. However, the studies indicated patients switch to natural supplements because they think they are safer. The research served as a guideline for healthcare professionals to aid their patients' choice of treatment.

Studies have also shown that gotu kola has positive effects on **varicose veins**, poor blood circulation in the legs and the rest of the circulatory system, leg cramps, and leg swelling. The circulatory improvement occurs

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KEY TERMS

Amino acids—Nitrogen compounds that make up the main structure of proteins in the body.

Dementia—Irreversible mental deterioration.

Episiotomy—A surgical incision of the vaginal opening made during childbirth to avoid tearing during delivery.

Flavonoids—Generic term for compounds, such as plant compounds that help in treatment and prevention of diseases. Over 4,000 flavonoids are classified based on their chemical composition. These include citrus bioflavonoids, green tea polyphenols, and quercetin.

Glycoside—Compound containing a sugar component such as glucose and a nonsugar component such as triterpenes.

Leukorrhea—White discharge from the vagina, normally occurring during the menstrual cycle, pregnancy, lactation, and menopause. A change in color, amount, or odor is a symptom of a reproductive tract disorder.

Scleroderma—Immune system disorder where collagen (a protein found in connective tissue, bone, skin, etc.) forms in an abnormal manner. Can affect many body organs and tissues such as the heart, lungs, gastrointestinal tract, joints, kidneys, and skin.

because gotu kola decreases vein hardening, improves the connective tissue around veins, and helps the blood to flow through veins. These circulatory and leg benefits were evident in 80% of patients tested in studies conducted in the late 1980s.

Gotu kola also has positive effects on various skin problems. Animal research has shown that tripenoid asiaticoside may help **wounds** heal quicker. Other studies showed that gotu kola helped in healing surgical wounds of the ear, nose, and throat, and promoted healing of episiotomies, **gangrene**, skin grafts, and some skin ulcers. Asiaticoside can also toughen skin, hair, and nails. Research has shown that asiaticoside may provide treatment for leprosy. Leprosy-causing bacteria are coated in a wax-like substance that the immune system cannot penetrate. However, gota kola disintegrates this substance, allowing the immune system to attack the bateria.

Clinical trials also show that gotu kola's tripenoids, when purified, can lessen the ravages of scleroderma. Gotu kola can reduce hardening of the skin, decrease joint **pain**, and increase finger movement.

Gotu kola extracts can heal second- and third-degree **burns** from boiling water or **gas** explosions if the burn is treated immediately. Either topical application or intramuscular injections can stop the effects of skin **infections** from burns and can stop or reduce skin shrinkage, inflation, and scarring.

Gotu kola extract might be effective in fighting tumors. However, researchers are cautious because animal and human studies need to be completed.

Preparations

Gotu kola is often eaten in a salad. It can also be made into a tea by using 0.5–1 tsp (2.5–5 ml) of gotu kola in 1 cup (250 ml) of boiling water. The plant is steeped for 10–15 minutes and the tea is then drunk. This amount can be consumed up to three times a day. Because of its bitter taste, the tea can be enhanced with honey or lemon to taste.

For a poultice on wounds or skin problems, gotu kola leaves can be crushed and applied, or a tincture may be used. A poultice can also be made from gotu kola tea.

For scleroderma, suggestions include 70 mg twice a day. The usual dosage is 0.5–1 g three times daily, a standardized extract dosage is 60–120 mg a day, and a liquid extract approximately 0.5–1 tsp can be taken daily.

Precautions

Children under two years old, pregnant women, and people with **epilepsy** should avoid gotu kola. Fair-skinned people and others who have had an allergic reaction to sunlight or other ultraviolet light sources should avoid these sources if they take gotu kola.

Side effects

A rash is the most common side effect when gotu kola is taken internally or applied topically. If injected, some pain and bruising may occur at the injection sight. The asiaticoside component could be a mild skin carcinogen. It is not wise to apply gotu kola topically over a long period of time. The plant may also cause mild headaches or **nausea**. As with any supplement, consultation with a healthcare professional should occur before beginning treatment.

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Interactions

Gotu kola should not be mixed with oral diabetes medication or drugs such as Lipitor, Lopid, Mevacor, and Zocor, all of which lower **cholesterol**. Gotu kola can raise cholesterol. It is also best not to mix gotu kola with alcohol or sedatives.

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Sharon Crawford

Gout

Definition

Gout is a form of acute arthritis that causes severe **pain** and swelling in the joints. It most commonly affects the big toe, but may also affect the heel, ankle, hand, wrist, or elbow. It affects the spine often enough to be a factor in lower back pain. Gout is often a recurring condition. An attack usually comes on suddenly and goes away after 5–10 days. Gout occurs when there are high levels of uric acid circulating in the blood, and the acid crystallizes and settles in the body. According to the National Institutes of Health (NIH), gout accounts for about 5% of all cases of arthritis reported in the United States.

Gout appears to be on the increase in the American population. According to a study published in November 2002, there was a twofold increase in the incidence of gout over the 20 years between 1977 and 1997. It is not yet known whether this increase is the result of improved diagnosis or whether it is associated with risk factors that have not yet been identified.

Gout

Gout risk factors

- Family history of the disease
- Male
- Overweight
- Excessive alcohol
- Purine-rich diet
- Enzyme defect that makes it difficult for the body to break down purines
- Exposure to lead in the environment
- Organ transplant recipient
- Use of medicines such as diuretics, aspirin, cyclosporine, or levodopa
- Take niacin (vitamin)

Signs of gout

- Hyperuricemia
- Presence of uric acid crystals in joint fluid
- More than one attack of acute arthritis
- Arthritis that develops in a day, producing a swollen, red, and warm joint
- Attack of arthritis in only one joint, often the toe, ankle, or knee

SOURCE: National Institute of Arthritis and Musculoskeletal and Skin Diseases, National Institutes of Health, U.S. Department of Health and Human Services

(Illustration by GGS Information Services. Cengage Learning, Gale)

Description

Uric acid is formed in the bloodstream when the body breaks down waste products, mainly those containing purines. Purines can be produced naturally by the body, and they can be ingested from such high-purine foods as meat. Normally, the kidneys filter uric acid particles out of the blood and excrete it into the urine. If the body produces too much uric acid or the kidneys are not able to filter enough of it out, there is a buildup of uric acid in the bloodstream. This condition is known as hyperuricemia.

Uric acid does not tend to remain dissolved in the bloodstream. Over the course of years, or even decades, hyperuricemia may cause deposits of crystallized uric acid throughout the body. Joints, tendons, ear tips, and kidneys are favored sites. When the immune system becomes alerted to the urate crystals, it mounts an inflammatory response that includes the pain, redness, swelling, and damage to joint tissue that are the hallmarks of an acute gout attack.

The body's uric acid production tends to increase in males during puberty. Therefore, nine out of ten people with gout are men. Since it can take up to 20 years of hyperuricemia to have gout symptoms, men do not

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KEY TERMS

Allopurinol—A drug that corrects hyperuricemia by inhibiting urate production.

Colchicine—A drug used to treat painful flare-ups of gout.

Constitutional remedy—A homeopathic medicine prescribed according to each person's character and temperament as well as symptoms.

Corticosteroids—Medications related to a natural body hormone called hydrocortisone, which are used to treat inflammation.

Hyperuricemia—High levels of uric acid in the bloodstream.

Kidney stones—Hard lumpy masses of mineral wastes that are formed in the kidneys and may cause blockages.

Purine—A substance found in foods that is broken down into urate and may contribute to hyperuricemia and gout.

Synovial fluid—Fluid surrounding the joints which acts as a lubricant, reducing the friction between the joints.

Tophus (plural, tophi)—A chalky deposit of a uric acid compound found in gout. Tophi occur most frequently around joints and in the external ear.

commonly develop gout until reaching their late 30s or early 40s. If a woman does develop gout, typically, it will be later in her life. According to some medical experts, this is because estrogen protects against hyperuricemia. It is not until estrogen levels begin to fall during **menopause** that urate crystals can begin to accumulate.

Hyperuricemia does not necessarily lead to gout. The tendency to accumulate urate crystals may be due to genetic factors, excess weight, or overindulgence in the wrong kinds of food. In addition, regular use of alcohol to excess, the use of diuretics, and the existence of high levels of **cholesterol** and triglycerides in the blood can increase the risk of developing the disease. In some cases, an underlying disease such as lymphoma, **leukemia**, or hemolytic **anemia** may also lead to gout.

Causes and symptoms

An acute episode of gout often starts without warning. The needle-like urate crystals may be present in the joints for a long time without causing symptoms. Then, there may be a triggering event such as a stubbed toe, an infection, surgery, **stress**, **fatigue**, or even a heavy drinking binge. Patients in intensive care units (ICUs) may have an acute flare-up of gout. In addition, it is now known that chronic occupational exposure to lead leads to decreased excretion of urates and an increased risk of developing gout.

In many cases, the gout attack begins in the middle of the night. There is intense pain, which usually involves only one joint. Often it is the first joint of the big toe. The inflamed skin over the joint is warm, shiny, and red or purplish, and the pain is often so excruciating that the individual cannot tolerate the pressure of bedcovers. The inflammation may be accompanied by a **fever**.

Acute symptoms of gout usually resolve in about a week, and then disappear altogether for months or years at a time. Eventually, the attacks may occur more frequently, last longer, and do more damage. The urate crystals may eventually settle into hard lumps under the skin around the joints, leading to joint deformity and decreased range of motion. These hard lumps, called tophi, may also develop in the kidneys and other internal organs, under the skin of the ears, or at the elbow. People with gout also have a heightened risk of kidney disease, and almost 20% of people with gout develop **kidney stones**. The relationship between gout and kidney stone formation is still not completely understood.

Diagnosis

Doctors can diagnose gout based on a physical examination and the patient's description of symptoms. In order to detect hyperuricemia, doctors can administer a blood test to measure serum urate levels. However, high urate levels merely point to the possibility of gout. Many people with hyperuricemia do not have urate crystal deposits. Also, it has been shown that up to 30% of people with gout have normal serum urate levels, even at the time of an acute gout attack. The most definitive way to diagnose gout is to take a sample of fluid from an affected joint and test it for the presence of the urate crystals.

Treatment

The symptoms of gout will stop completely a week or so after an acute attack without any intervention. It is important, however, to be diagnosed and treated by a health care practitioner in order to avoid attacks of increasing severity in the future and to prevent permanent damage to the joints, kidneys, and other organs.

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During an acute attack, treatment should focus on relieving pain and inflammation. On an ongoing basis, the focus is on maintaining normal uric acid levels, repairing tissue damage, and promoting tissue healing.

Diet

Generally, gout is unheard of in vegetarians. It is a condition that responds favorably to improvements in diet and **nutrition**. Recurrent attacks can be avoided by maintaining a healthy weight and limiting the intake of purine-rich foods. A diet high in fiber and low in fat is also recommended. Processed foods should be replaced by complex carbohydrates, such as whole grains. Protein intake should be limited to under 0.8g/kg of body weight per day.

Nutritional supplements

Vitamin E and **selenium** are recommended to decrease the inflammation and tissue damage caused by the accumulation of urates.

Folic acid has been shown to inhibit xanthine oxidase, the main enzyme in uric acid production. The drug allopurinol is used for this same purpose in the treatment of gout. The therapeutic use of folic acid for this condition should be prescribed and monitored under the supervision of a heath care practitioner. The recommended dosage range is 400-800 micrograms per day.

The **amino acids** alanine, aspartic acid, glutamic acid, and glycine taken daily improve the kidneys' ability to excrete uric acid. **Bromelain**, an enzyme found in pineapples, is an effective anti-inflammatory. It can be used as an alternative to NSAIDs and other prescription anti-inflammatory drugs. It should be taken between meals at a dosage of 200-300 mg, three times per day.

The bioflavonoid **quercetin** helps the body absorb bromelain. It also helps decrease uric acid production and prevents the inflammation that leads to the acute symptoms of gout and the resulting tissue destruction. Quercetin should be taken at the same time and dosage as bromelain: 200-400 mg, between meals at a three times per day.

Herbs

Dark reddish-blue berries such as cherries, blackberries, **hawthorn** berries, and elderberries are very good sources of flavonoid compounds that have been found to help lower uric acid levels in the body. Flavonoids are effective in decreasing inflammation and preventing and repairing the destruction of joint tissue. An amount of the fresh, frozen, dried, juiced, or otherwise extracted berries equal to half a pound (about 1 cup) fresh should be consumed daily.

Devil's claw (*Harpagophytum procumbens*) has been shown to be of benefit. It can be used to reduce uric acid levels and to relieve joint pain.

Gout represents a serious strain on the kidneys. The dried leaves of nettles, *Urtica dioica,* can be made into a pleasant tea and consumed throughout the day to increase fluid intake and to support kidney functions. However, some people are allergic to nettles.

Therapy

Colchicum is a general homeopathic remedy that can be used for pain relief during a gout attack. It is formulated from the same plant, Autumn crocus, as the drug colchicine, used in the conventional treatment of gout. Gout may be improved by having a constitutional remedy prescribed that is based on the tendency to develop the disease and its symptoms.

During the acute phase of gout, **acupuncture** can be helpful with pain relief.

Applications of ice or cold water can reduce pain and inflammation during acute attacks.

Allopathic treatment

Standard medical treatment of acute attacks of gout includes nonsteroidal anti-inflammatory drugs (NSAIDs) such as naproxen sodium (Aleve), ibuprofen (Advil), or indomethacin (Indocin). Daily doses until the symptoms have subsided are recommended. Colchicine (Colbenemid), is also used. Corticosteroids such as prednisone (Deltasone, prednisolone, and corticotropin [ACTH]) may be given orally or may be injected directly into the joint for a more concentrated effect. Because these drugs can cause undesirable side effects, they are used for only about 48 hours so as not to cause major problems. Aspirin and other salicylates should be avoided, because they can impair uric acid excretion and may interfere with the actions of other gout medications.

Once an acute attack has been successfully treated, doctors try to prevent future attacks of gout and long-term joint damage by lowering uric acid levels in the blood. Colchicine is the drug of choice to deter recurrence. This medication can be very hard on the vascular system and the kidneys, however, and it is incompatible with a number of antidepressants, tranquilizers, and antihistamines. It should be avoided by pregnant women and the elderly.

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There are two types of drugs used for lowering uric acid levels. Sometimes these drugs resolve the problem completely. However, the use of low-level amounts may be required for a lifetime. Uricosuric drugs, such as probenecid (Benemid) and sulfinpyrazone (Anturane), decrease urates in the blood by increasing their excretion. These drugs may also promote the formation of kidney stones, and they are contraindicated for patients with kidney disease. Xanthine oxidase inhibitors block the production of urates in the body. They can dissolve kidney stones as well as treat gout. Allopurinol is the drug most used in this respect. Its adverse effects include reactions with other medications, and the aggravation of existing skin, vascular, kidney, and liver dysfunction.

Expected results

Gout cannot be cured, but it can be managed successfully. Prompt attention to diet and reducing uric acid levels will rectify many of the problems associated with gout. Kidney problems can also be reversed or improved. Tophi can be dissolved or surgically removed, and with the tophi gone, joint mobility generally improves. Gout is generally more severe in those whose initial symptoms appear before age 30. The coexistence of **hypertension**, diabetes, or kidney disease can make for a much more serious condition.

Prevention

For centuries, gout has been known as the "rich man's disease," a disease of overindulgence in food and drink. While this view is perhaps oversimplified, lifestyle factors clearly influence a person's risk of developing gout. For example, losing weight and limiting alcohol intake can help ward off gout. Since purines are broken down into urates by the body, consumption of foods high in purine should be limited. Foods that are especially high in purines are red meat, organ meats, meat gravies, shellfish, sardines, anchovies, mushrooms, cooked spinach, rhubarb, yeast, asparagus, beer, and wine.

Dehydration promotes the formation of urate crystals, so people taking diuretics, or "water pills," may be better off switching to another type of blood pressure medication. Increased intake of fluids will dilute the urine and encourage excretion of uric acid. Therefore, six to eight glasses of water should be consumed daily, along with plenty of herbal teas and diluted fruit juices.

Consumption of saturated fats impedes uric acid excretion, and consumption of refined carbohydrates, such as sugar and white bread and pasta, increases uric acid production. Both should be seriously limited.

The use of **vitamin C** should be avoided by people with gout, due to the high levels of acidity.

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National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS). National Institutes of Health (NIH), 1 AMS Circle, Bethesda, MD 20892-3675. http://www.niams.nih/gov.

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Patience Paradox
Rebecca J. Frey, PhD

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Grains-of-paradise fruit

Description

Grains-of-paradise fruit is a member of the Zingiberaceae family (**ginger** group), which is a major family of tropical and subtropical fruits. It is also known as Guinea grains, Melegueta pepper, Piper melegueta and *Aframomum melegueta roscoe*, which is its botanical name.

Aframomum melegueta roscoe is a perennial herb that produces a spicy edible fruit commonly found in the tropical regions, particularly of western Africa. It is somewhat palm-like in appearance, forming dense clumps and growing to a height of 4-5 ft (1.2-1.5 m), with divided smooth leaves that can be up to 9 in (23 cm) long.

There are two types of grains-of-paradise fruit. They resemble the spice cardamom in appearance and pungency, and the commercial variety is perhaps even closer in appearance and scent. True grains-of-paradise fruit tends to be less pungent than cardamom once cooked or heated.

The seeds are approximately oval in shape, hard, shiny, and reddish-brown color, whereas cardamom is pale buff-colored. Powdered grains-of-paradise fruit are pale gray. This spice is aromatic and can be distinguished by its hot peppery taste.

General use

In Africa and throughout the tropics, grains-of-paradise fruit (*Aframomum melegueta*) is a cultivated crop and is used as a remedy for a variety of ailments, although it is now rarely used outside these areas. It is one of the plants extensively made use of by African ethnomedicine.

Some confusion surrounds the identity of the true grains-of-paradise fruit, as approximately seven species of fruit are also sometimes mistakenly referred to as grains-of-paradise fruit, particularly *Malabar cardamom*, *Cardamomum malabaricum*, and *Cardamomum minus*, also the Zanzibar pepper. Grains-of-paradise fruit have even been confused with ***Nux vomica***, which is used as a homeopathic remedy. In fact, it is now recognized that *Aframomum melegueta roscoe* is the authentic species. The name "grains-of-paradise fruit" dates from the Middle Ages, and denotes the fact that it was once a highly valued commodity. The west African coast became known as the Grain Coast because grains-of-paradise fruit was traded there.

KEY TERMS

Antifungal—A drug or compound effective in treating fungal infections.

Antimicrobial—A drug or medication effective against disease-causing micro-organisms.

Aphrodisiac—A food or drug that stimulates sexual desire.

Ethnomedicine—Medicine pertaining to a particular ethnic group.

Phytomedicinals—Medicinal substances derived from plants.

Schistosomiasis—Also called bilharziasis, this is a disease caused by bodily infestation of blood flukes.

Considered to be spicy, hot, and slightly bitter, the active constituents of grains-of-paradise fruit include **essential oils** such as gingerol, paradol, and shagaol. It also contains **manganese**, gum, tannin, starch, and a brown resin. It has been proven to be an effective antifungal and antimicrobial agent.

Like cardamom, it is also used as a condiment, due to its pleasant taste, which is pungent without being intensely bitter. It is mainly used nowadays to flavor wines, spirits and particularly beer, although during the Middle Ages it was a favorite spice in Europe and other parts of the world. This spice, despite its popular beginnings, is hardly known outside of Africa today. Nevertheless, it remains popular as a spice in Arab cuisine, particularly Morocco and Tunisia. It has also been used as a pepper substitute, and may be chewed in cold weather to warm the body. In addition, it is a common addition to veterinary remedies.

The essential oil of grains-of-paradise is available, though not easy to find. Its properties are similar to those of the fruit, but it is often chosen for its fragrance. Grains-of-paradise fruit is used in African countries as an aphrodisiac as well as a treatment for **measles** and leprosy. Interestingly, extract of *Aframomum melegueta* has been shown in laboratory studies to increase sexual arousal and behavior in male rats. It is also used to reduce hemorrhage, particularly associated with **childbirth**.

Other phytomedicinal uses of grains-of-paradise include as a purgative (strong laxative), galactogogue (to increase production of breastmilk), anthelmintic (antiparasitic—it is effective against **worms**, etc.), and

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hemostatic agent (purifies the blood). It has even been found to be effective against the dreaded schistosomiasis, which is a major problem to the medical authorities on the African continent.

Grains-of-paradise fruit is also effective against intestinal **infections** and infestations, and is also used to calm **indigestion** and **heartburn**. Interestingly, grains-of-paradise fruit is one of the plants presently being researched as a possible alternative to allopathic medicines in tropical countries, where they are attempting to find cheaper and more readily available local phyto-medicinal alternatives to their common health problems, which are chiefly the effects of tropical diseases. Phyto-medicines have often proved to be more effective than synthetic agents. In addition they have a more sympathetic effect on the body, and their production is compatible with current environmental concerns.

Grains-of-paradise are also used in Chinese herbal medicine, their use being interchangeable with the more readily available cardamom. It is taken for **nausea** and **vomiting**, intestinal discomfort, and **pain** and discomfort during **pregnancy**.

Preparations

The fruit is exclusively the part of the plant used, dried, whole, or powdered. The essential oil can also be obtained. The whole grains may be chewed or can be ground and incorporated into mixtures.

Precautions

As grains-of-paradise fruit is a name given to so many other spices, it is advisable to ensure that the correct species is obtained.

Aframomum melegueta roscoe is included in the FDA's list of botanicals that are generally recognized as safe.

Side effects

No side effects have been reported from grains-of-paradise fruit; however, this spice is not frequently used in the United States. People who are allergic to cardamom or ginger should use grains-of-paradise fruit with caution.

Interactions

No interactions have been reported with standard prescription medications.

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Centre for Economic Botany, Royal Botanic Gardens, Kew; Richmond, Surrey; TW9 3AE, United Kingdom. Fax: +44 (0)20 8332 5768. www.rbgkew.org.uk.

Centre for International Ethnomedicinal Education and Research (CIEER). www.cieer.org.

Patricia Skinner
Rebecca J. Frey, PhD

Grape seed extract

Description

Grape seed extract is the primary commercial source of a group of powerful **antioxidants** known as oligomeric proanthocyanidins (OPCs), also generically called pycnogenol, a class of flavonoids. Laboratory studies have indicated OPCs are much more effective than **vitamin C** and **vitamin E** in neutralizing free oxygen radicals, which contribute to organ degeneration and **aging** in humans. The primary sources of OPCs are **pine bark extract** and grape seed extract. However, the grape seed extract is more widely recommended for its lower cost and because it contains an antioxidant not found in pine bark. Grape skins contain a compound known as **resveratrol**, found to contain protective properties against cardiovascular disease and a variety of cancers.

General use

Grape seed extract is a mixture of complex compounds. It has a wide range of therapeutic uses, from preventing **cancer** and cardiovascular disease to alleviating symptoms of **allergies**, ulcers, and **cataracts**. Its antioxidant properties are believed to help slow the aging process. Procyanidins, a group of compounds found in the extract, are thought to increase the effectiveness of other antioxidants, especially vitamin C and vitamin E, by helping them regenerate after neutralizing free radicals in the blood and tissue. OPCs in the extract are water-soluble, making them easily

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absorbed by the body. They also are able to cross the stubborn blood-brain barrier, providing antioxidant protection to the brain and nervous system. Most of the research on grape seed extract has been done in Europe, so many of its reported benefits have not been reviewed or approved by the U.S. Food and Drug Administration. It is available as an over-the-counter supplement. According to Varro E. Tyler, dean emeritus of the Purdue University School of Pharmacy and Pharmacal Sciences, the procyanidin compounds found in grape seed extract are useful in treating vascular disorders. They also are antioxidants, or free-radical scavengers, that help prevent some age-related cancers and **atherosclerosis**. Grape seed extract is a relatively new supplement in the United States, although it has been used in Europe for several decades. Its antioxidant properties were realized in the 1980s with the so-called French paradox, in which researchers discovered that the French had low rates of **heart disease** even though their diet was high in **cholesterol**. This was credited to their widespread consumption of red wine. Further research led to the OPCs concentrated in grape seeds. Subsequent research suggested that grape seed extract may work at the genetic level, activating a gene that stops oxidation of bad cholesterol. A 2003 study found that grape seed extract worked well in replacing estrogen and blunting **hypertension** in postmenopausal women.

Cardiovascular disease

European studies have shown procyanidins to be useful in treating blood vessel disorders, such as fragile capillaries and poor circulation in the veins. Components bind to the walls of the capillaries, making them less likely to break down with the effects of aging. In one European study, researchers found that treatment with grape seed extract quickly relieved a chronic condition of poor circulation in the veins. Grape seed extract also has been beneficial in treating **edema**, an excessive accumulation of fluid in tissue. Another use of grape seed extract is reducing blood pressure in people with hypertension.

Cancer

Researchers at the University of Colorado Health Sciences Center, working with cell cultures and laboratory mice, demonstrated that grape seed extract can inhibit growth of colorectal tumors. Tumors decreased by 44%, according to a 2006 article in *Drug Discovery & Development*. The preclinical study demonstrated that grape seed extract has cancer fighting properties, and the research revealed the molecular mechanism at work in the process. Researchers caution that more studies are needed.

A 2006 study at City of Hope, a cancer treatment facility in California, found that components in grape seed extract and red wine can suppress the production of estrogen, a hormone that contributes to the growth of **breast cancer**. Researchers say that the study demonstrates that grape seed extract may be potentially useful in both the treatment as well as the prevention of hormone-dependent breast cancer. The National Cancer Institute continues to fund studies evaluating whether grape seed extract is effective in preventing breast and prostate cancers.

Respiratory conditions

Grape seed extract has been found to be beneficial in treating several respiratory conditions, including **asthma**, **emphysema**, allergies, and sinusitis. Pycnogenol helps inhibit the production of histamines, which decreases sensitivity to pollens and food allergens, thereby reducing allergic reactions.

High blood pressure

A small-scale, placebo-controlled clinical trial, reported in 2005, studied grape seed extract's effect on high blood pressure in three groups of eight men and women. Two groups received grape seed extract, one in 150 mg daily dosage and the other is a 300 mg daily dosage for the one-month trial period. Researchers found that both groups demonstrated a drop in blood pressure, with the group taking the higher daily dosage also showed a decrease in LDL cholesterol levels.

Other conditions

OPCs in grape seed extract have shown effectiveness in treating a variety of other conditions. As an anti-inflammatory, it helps prevent swelling of joints, heals damaged tissue, and eases **pain** in people with arthritis. Studies have shown OPCs can stop cataract progression, treat and prevent **glaucoma**, and aid in treating several types of retinal disease. One of the extract's most popular uses is in treating the effects of aging, including preventing wrinkles by protecting the skin against ultraviolet radiation damage from **sunburn**, improving skin elasticity and tone, and helping reduce the appearance of scars and stretch marks. A wide range of anecdotal reports tell of grape seed extract helping treat or reduce the effects of headaches, **hemorrhoids**, diabetes, **prostate enlargement**, and **cellulite**, although no clinical research supports these claims.

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Resveratrol

In 1992, scientists began exploring potential health benefits of resveratrol, a compound derived from grape skins and found in red wine. Researchers working with cell cultures found that resveratol has cardioprotective and anticancer properties, suppressing the proliferation of a wide variety of tumor cells. However, in a 2004 study at the Medical University of South Carolina, researchers studying the human metabolism of resveratrol found that even when ingesting resveratrol in very high dietary amounts, there may not be high enough levels of the compound remaining in the tissue to bring about the cardioprotective and anticancer effects demonstrated in cell culture studies.

Preparations

Grape seed extract generally is available in 50 mg and 100 mg capsules. The acceptable adult daily dosage has been estimated at up to 150–200 mg, or 50 mg per 50 lb (22.7 kg) of body weight. In Europe, OPCs usually are prescribed at 300 mg a day to treat medical conditions such as **varicose veins**, edema, allergies, inflammation, and skin aging. The extract contains varying amounts of proanthocyanics, although the label should indicate about 75–80% proanthocyanidins to be effective. Products standardized to 95% OPC will maximize potency. Research in the United States and Europe has shown it is most effective when used in combination with other antioxidants, especially vitamin C and vitamin E. Grape seed extract is fully absorbed by the body within one hour after consumption. One-half the original dose is still functional within the body after seven hours.

In 2003, a liquid grape seed extract was made available in the United States. This version can be used in a number of beverages, including bottled water, without changing their taste. A 2003 trial at Ohio State University found that lotions made with grape seed extract helped **cuts** heal more quickly than they would on their own. The lotion helped improve blood flow to the wound site.

Precautions

Persons with serious conditions such as cancer, diabetes, and cardiovascular disease should not substitute grape seed extract for their existing treatments without first consulting with their doctor. There is no clinical evidence that grape seed extract can cure any of these conditions. Since grape seed extract is water-soluble, any excess intake that is not used by the body is eliminated in the urine. Studies have shown it is not carcinogenic, does not cause birth defects, and does not cause cells to mutate. Pregnant women and those with autoimmune conditions should probably avoid grape seed extracts. It is best to check with a clinician to ensure the safest dosage is being taken, as reports may vary on the latest research. Grape seed extract is not recommended for pregnant women. Some researchers caution that grape seed proanthocyanidins may interfere with blood-clotting drugs.

KEY TERMS

Antioxidant—A substance that opposes oxidation damage in the body caused by free oxygen radicals.

Atherosclerosis—A buildup of fatty substances in the inner layers of the arteries.

Flavonoids—Also known as bioflavonoids, a group of about 5,000 substances, mostly derived from food, that have super-antioxidant qualities.

Free oxygen radicals—Also called free radicals, these by-products of oxygen cause oxidative damage to the body's cells.

Histamine—A compound found in tissue that plays a major role in allergic reactions.

Resveratrol—A polyphenolic compound found in various plants, including wine grapes (especially the skins), berries, and peanuts.

Side effects

Nausea and upset stomach have been reported on occasion. More rarely, allergic reactions in the form of temporary skin **rashes** have occurred in persons sensitive to grape products. As of 2008, there were no reported serious side effects associated with taking grape seed extract. It is non-toxic, even at high dosages.

Interactions

As of 2008, there were no reported negative interactions associated with grape seed extract. Several studies done in the United States and Europe show the extract has a positive reaction with vitamin C and vitamin E. Studies have shown that OPCs in grape seed extract are as much as 50 times more potent than those in vitamin E and up to 20 times more potent than OPCs in vitamin C.

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Paula Ford-Martin
Clare Hanrahan

Graves' disease *see* **Hyperthyroidism**

KEY TERMS

Antioxidant—Agent that helps rid the body of damaging free radicals (unstable oxygen molecules).

Bioflavonoid—A large group of phytochemicals with antioxidant and immune-boosting properties.

Oligomeric proanthocyanidins (OPCs)—Part of a large group of phytochemicals called bioflavonoids.

Polyphenol—Acid compound in plants.

Resveratrol—An enzyme that promotes health and is found in 72 varieties of plants.

Grape skin

Description

Appearance

Grape skin, the outer layer of the grape (*Vitis vinifera*), is either green, red, or purplish-black in color. The skin, stem, seeds, and juice of the grape are used in making wine. Although the skin, stem, and seeds are often used in making the nutritional supplement, grape skin extract, the extract sometimes contains grape skin only. Generally, the skin of red grapes is used in making nutritional supplements.

History

In 1535, sailors on Jacques Cartier's expedition to Canada became seriously ill with scurvy, a vitamin deficiency. This degenerative disease of connective tissues was caused by the lack of vitamins in the typical seafarer's diet—a menu of dried meat and biscuits. The crew was saved by the advice of a Native American, who recommended drinking tea made from the bark of a particular species of pine tree. In the 1930s, researchers discovered that the ascorbic acid (**vitamin C**) in fruits and vegetables prevented scurvy.

The pine extract, however, contained very little vitamin C. For more than 50 years, European biochemists have been researching the seafarers' more likely rescuer—a family of antioxidant polyphenols (acid compounds) called pycnogenols, whose primary active compounds are pigments called oligomeric proanthocyanidins (OPCs). French chemist Jack Masquelier isolated OPCs from peanut skins in 1947 and coined the term "pycnogenols" to describe the unique class of polyphenols to which OPCs belong.

Although people have been drinking wine for centuries, scientific research into the health benefits of products derived from red grapes began in Europe in the mid to late twentieth century. Supplemental OPCs have been used in Europe since 1950 to treat weak blood capillaries, postsurgical **edema** (swelling), **cirrhosis** (liver disease), **varicose veins**, and diabetic **retinopathy** (eye disease resulting from diabetes). Early identification of OPCs as useful for treating capillary fragility gave researchers some indication of their potential value in connective tissue disorders. However, this limited focus tended to overlook the additional therapeutic possibilities of OPCs and, until the latter part of the twentieth century, distracted scientists from investigating broader uses for OPCs.

Aside from pine bark, OPCs are concentrated in grape seeds and skins, wine, green and black teas, beans, and the skins of many fruits. Generally, the more intense the color, the more OPCs in the food, which explains why red wine has a greater health benefit than white wine. When red wine is made, the "must" is used—the skins, seeds, and stems. The must is left in the mixture for a long period of time as the wine ferments and the OPCs emerge, giving red wine its characteristic flavor and color.

In the case of white wine, the must is taken out early, so the wine neither darkens nor absorbs as many OPCs. Grape juice also contains OPCs. However, researchers have found that grape juice may not confer the same health benefits as red wine.

Biologic components

Red grape skins contain an array of **bioflavonoids** (**quercetin**, catechins, flavonols, and anthocyanidins) and nonbioflavonoid polyphenols (acid derivatives).

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One important nonbioflavonoid in grape skin is called **resveratrol**. Resveratrol is a plant-specific enzyme that exists in 72 plant species, such as grapes, peanuts, and pine trees. Grapes are the most abundant source of this health-promoting enzyme.

Resveratrol's presence in the plant is induced by **stress**, injury, infection or ultraviolet irradiation. It is thought that the injury to the grape skin, produced during the wine-making process, significantly increases resveratrol levels. The relatively high quantities of the enzyme in the grape skins are thought to help the plant resist **fungal infections**, diseases, adverse weather, and insect or animal attack.

General use

There are many possible therapeutic applications of the resveratrol in red grape skin. In clinical studies, resveratrol demonstrated equivalent or better anti-inflammatory effects compared to the well-established anti-inflammatory drugs phenylbutazone and indomethacin. In animal studies, resveratrol inhibited both the acute and chronic phases of inflammation.

In humans, some researchers have found that resveratrol thins the blood more effectively than aspirin, which is often used to decrease the risk of a **heart attack**. In fact, the phrase "French paradox" refers to the idea that although French men consume a high-fat diet, they have one-third as many heart attacks as American men. Moreover, French men have high **cholesterol** and blood pressure levels similar to their American counterparts. Researchers have discovered that the main reason for this phenomenon is the OPCs from the grape skin, not the alcohol content, in the red wine that the French drink.

Preliminary tests in animals also indicate that resveratrol may interfere with the development of **cancer** in three ways: by blocking the action of cancer-causing agents, by inhibiting the development and growth of tumors, and by causing precancerous cells to revert to normal.

Although researchers are uncertain about how much resveratrol is needed to produce beneficial effects in humans, supplementation with red grape skin extract or consuming a glass or two of red wine may prevent or alleviate the following conditions:

- aging
- bruising (capillary fragility)
- cancer (cancer-inhibiting effects)
- diabetes
- fungal infection
- heart disease (hardening of the arteries and high cholesterol)
- inflammation (including bursitis and tendonitis)
- Raynaud's syndrome (a blood vessel disorder)
- varicose veins
- vision problems (including cataracts and glaucoma)
- wound healing

Preparations

Red grape skin extract is prepared in capsule form as a nutritional supplement. For adult maintenance, the therapeutic range is thought to be 200–600 mg at 30% anthocyanins (OPCs), although guidelines have not been definitively established.

The resveratrol found in red grape skin and its extract is also found in red wine and concord grape juice. However, grape juice has been found to have fewer benefits than red wine, due to the technique for processing the grapes. For example, grape juice has only one-third the anti-clotting properties of red wine.

Precautions

Although research is limited, scientific investigators have not issued any precautions regarding the use of grape skin or grape skin extract. However, people should be aware of the known side effects of red wine and resveratrol.

Side effects

There are many potential side effects to consuming excessive quantities of red wine (such as allergic reactions to sulfites, intoxication, and liver damage) in order to obtain the health benefits of resveratrol. Each individual must weigh the risks versus the benefits of consuming alcohol.

Resveratrol itself is also a phytoestrogen (plant estrogen). The estrogenic properties of this chemical may play a role in the beneficial cardiovascular effects in red wine. These positive effects include increasing high-density lipoprotein (HDL), the "good cholesterol." On the other hand, it has been noted that drinking red wine may support the proliferation of certain **breast cancer** cells that require estrogen for growth. Thus, resveratrol may have undesirable side effects in some people, including those women with a history of breast cancer or postmenopausal women taking hormone replacement therapy.

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Interactions

Scientific investigation on the interactions of grape skin or grape skin extract with drugs, foods, or diseases is very limited and inconclusive. However, if the resveratrol in grape skin is consumed in red wine, a wide range of adverse interactions with drugs and foods may result. It is advisable to consult a physician before consuming alcohol in combination with any type of prescription or over-the-counter medication.

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ORGANIZATIONS

American Heart Association, National Center. 7272 Greenville Avenue, Dallas, TX 75231. http://www.americanheart.org.

National Cancer Institute. Public Inquiries Office, Building 31, Room 10A03, 31 Center Drive, MSC 2580, Bethesda, MD 20892. http://www.nci.nih.gov.

Genevieve Slomski

Grapefruit seed extract

Description

Grapefruit seed is prepared in extract form from the seeds, pulp, and white membranes of grapefruits from grapefruit trees (*Citrus paradisi*). The grapefruit tree, first discovered on the Caribbean island of Barbados in the seventeenth century, was brought to Florida in 1823 for commercial cultivation. The plant was probably named grapefruit because its fruits grow in bunches or clusters. Grapefruit seed extract (GSE) is used as a broad spectrum, non-toxic, antimicrobial compound. The extract comes in two forms, liquid and powder.

GSE was developed by Dr. Jacob Harich, a physicist who was born in Yugoslavia in 1919 and educated in Germany. His education in nuclear physics was interrupted by Word War II. After witnessing the horror of war as a fighter pilot, Harich decided to devote the rest of his life to improving the human condition. He then expanded his educational pursuits to include medicine, including gynecology and immunology. He came to the United States in 1957 to study at Long Island University in New York. As an immunologist, he was interested in studying natural substances that might help protect the body from undesirable microorganisms. In 1963, he moved to Florida, the heart of grapefruit country, and began research on the use of grapefruit seeds as a biocide. By 1990, holistic health practitioners began to recommend the use of GSE to their patients. In 1995, Harich was invited to the Pasteur Institute of France, a leading **AIDS** research center. Researchers at the Center have been investigating the potential of GSE as a prophylactic against the HIV virus as well as against some of the secondary **infections** associated with AIDS. He was also honored by farmers in Europe who use a powdered form of GSE in fish and poultry feed to control *Salmonella* and *Escherichia coli*. In 1996, Harich passed away.

General use

GSE is a broad spectrum bactericide, fungicide, antiviral, and antiparasitic compound. When used in vitro, GSE has been shown to be highly effective against a broad spectrum of bacteria, including *Staphyloccus aureus*, *Streptococcus pyogenes*, *Salmonella typhi*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Shigella dysenteriae*, *Legionella pneumoniae*, *Clostridium tetani*, *Diploccus pneumoniae*, and many others. GSE also strongly inhibits many types of pathogenic fungi and yeast.

Examples of external uses of GSE include:

- mouth and lips: mouthwash, mouth ulcers, thrush, bad breath, cracked lips, sunburned lips, and cold sores
- teeth and gums: plaque, tooth decay, toothaches, tooth extraction, gingivitis, and toothbrush cleaner
- nose and sinuses: sinusitis, runny nose (rhinitis), and nasal ulcer
- throat: sore throat, tonsillitis, coughs, hoarseness, and laryngitis

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- ears: ear cleaning, earaches, and inflammation of the middle ear (otitis media) in conjunction with internal use
- face: acne and shaving
- scalp and hair: shampoo, dandruff, itching scalp, and head lice
- skin: small cuts, skin abrasions, scratches, minor burns, rashes, dermatitis, psoriasis, shingles, eczema, nettle rash, insect bites and stings, tick and leech bites, leg ulcers, warts, and skin fungi
- feet: athlete's foot, sweaty feet, calluses, corns, blisters, nail fungi, and cuticular infections
- vagina and genitals: vaginitis, yeast infections, vaginal parasites, feminine hygiene, and fungal and parasitic diseases in the male genital area

Examples of internal uses include:

- acute and chronic inflammations in general
- colds and flu
- gastrointestinal infections
- vastritis and gastric and duodenal ulcers
- *Candida albicans* and other fungal diseases
- parasitic diseases
- allergies

Preparations

Grapefruit seeds and pulp contain a combination of **bioflavonoids** and polyphenolic compounds. The polyphenols are unstable but are chemically converted during the GSE synthesis process into more stable substances that belong to a class of compounds called quaternary ammonium compounds. The active quaternary ammonium compound in GSE, believed to be responsible for its antimicrobial properties, is a diphenol hydroxybenzene complex. The antimicrobial activity appears to develop in the cytoplasmic membrane of the microorganisms. The active ingredients disorganize the cytoplasmic membrane so that the uptake of **amino acids** is prevented. At the same time there is a leakage of low molecular weight cellular contents through the cytoplasmic membrane. Studies have also shown that GSE inhibits cellular respiration.

The extract is prepared by grinding grapefruit seeds and pulp into a fine powder. The powder is dissolved into purified water and distilled to remove fiber and pectin. The distilled slurry is spray dried at low temperatures forming a concentrated grapefruit bioflavonoid powder. This concentrated powder is dissolved in vegetable glycerin and heated. Food grade ammonium chloride and ascorbic acid are added. This mixture is heated under pressure where it undergoes catalytic conversion using natural catalysts, including hydrochloric acid and natural enzymes. The slurry is then cooled, filtered, and treated with ultraviolet light. Residual ammonium chloride in the final product is between 15 and 18%; residual ascorbic acid is between 25 and 35 mg/kg. There is no residue of hydrochloric acid in the final product. In the United States, standardized GSE contains 60% grapefruit extract materials and 40% vegetable glycerin. A powdered form of GSE is also available that contains 50% grapefruit extract materials, 30% silicon dioxide, and 20% vegetable glycerine.

To treat infections, 15 drops in 8 oz of water is used. For diaper yeast infections and as a vaginal douche, 10–15 drops of grapefruit seed extract is used in 4 oz of water.

Precautions

GSE has been shown to be non-toxic at levels many times greater than the recommended dosages. Even when taken daily, GSE seldom produces a significant allergic reaction. However, people who are allergic to citrus fruits should exercise caution in the use of GSE.

Citricidal®, the brand name of a GSE product in the United States containing 60% grapefruit seed extract in an aqueous, vegetable glycerine solution, has, in the United States, been labeled as GRAS (Generally Recognized as Safe) in the Code of Regulations. The U.S. Food and Drug Administration (FDA) has approved Citricidal® for cosmetic preparations. In addition, Citricidal® has also been approved by the FDA for the disinfection of foods.

Generally, GSE should never be used at full strength. GSE is extremely irritating to the eyes. If it gets into the eyes, a person should wash the eyes with large amounts of warm water and consult a physician, if necessary.

After an excessive ingestion of GSE, an individual should drink large amounts of water and take up to 3 tsp of **psyllium** husks (or up to 6 psyllium capsules). A doctor should be consulted, if necessary.

Side effects

Since GSE is quite acidic, if it is not properly diluted, it may further irritate already irritated tissues, such as a stomach or intestinal lining.

Interactions

Over 75 different combination herbal preparations containing GSE are available, based on the

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assumption of Chinese herbal medicine that combinations of substances are more beneficial than single remedies. In addition, the antimicrobial properties of GSE make it an excellent preservative, thus enabling the herbs it accompanies to retain their potency.

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Judith Sims

Green tea

Description

Green tea is produced from the leaves of the *Camellia sinensis*, or tea plant. Oolong and black tea are also produced from the plant but are processed and oxidized in different manners. Of the three, green tea contains the highest levels of polyphenols, the antioxidant substance that is believed to be beneficial in protecting against both **cancer** and **atherosclerosis**.

The tea plant is actually a variation of evergreen bush, with glossy green leaves and small white to pink flowers. The plants can reach a height of 30–40 ft (9–12 m) or taller in the wild, but are generally kept to a height of 6 ft (1.2 m) or less on the tea plantations and gardens where they are grown in China, Argentina, Japan, India, Indonesia, Kenya, Malawi, Sri Lanka, Turkey, Pakistan, Bangladesh, and Tanzania. Tea plants are cultivated in countries where warm, rainy growing conditions are abundant, and they are also frequently grown at high altitude.

When tea plants reach maturity at three or four years of age, the young leaves and leaf buds—the parts of the plant highest in polyphenols—are harvested. Green tea is produced by steaming or roasting the leaves as soon as they are picked and then rolling and drying the tea leaves to remove any moisture.

General use

Approximately 2.5 million tons of tea are grown and produced worldwide on an annual basis. Written records date the use of the plant as a beverage since at least the tenth century B.C. in China, and it is thought to be close to 5,000 years old. Tea is the most consumed beverage worldwide (after water). It is also one of the most popular herbal infusions—drunk regularly by over half the world's population.

Green tea plant. *(©PlantaPhile, Germany. Reproduced by permission.)*

Clinical and laboratory studies continue to demonstrate the benefits of green tea and its major extract, the antioxidant epigallocatechin-3-gallate (EGCG), as an effective treatment for various diseases.

Cancer

The polyphenols in green tea that act as **antioxidants** may actually inhibit the growth of existing cancer cells. In some animal studies, injections of tea extracts reduced the size of cancerous tumors in animals. In 2004, Hasan Mukhtar, Ph.D., of the University of Wisconsin, demonstrated in mice that the green tea extract EGCG is effective in fighting **prostate cancer**. Studies have also indicated that regular use of green tea may reduce the risk of other cancers, including oral, skin, colon, stomach, and rectal. In one clinical trial,

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patients with pre-cancerous mouth lesions who were treated with green and black tea extracts achieved a 38% decrease in the number of pre-cancerous cells. Research suggests that green tea can reduce the risk of basal-cell carcinoma and squamous-cell carcinoma. The *Journal of the American College of Surgeons* reported in 2006 that the antioxidants in green tea may block tumor formation and growth and also may inhibit formation of clots and help keep artery walls functioning properly.

Arthritis

One study, reported in 2007 in *Arthritis Today*, examined the anti-inflammatory properties of green tea using the synovial cells from people with **rheumatoid arthritis**. Researchers discovered that the green tea-treated cells acted to block the ability of inflammatory chemicals to cause joint damage.

Alzheimer's disease

In 2005, researchers at the University of South Florida, working with tissue cultures and with mice genetically programmed to develop degenerative brain disease, reported that a concentrated extract of the antioxidant EGCG found in green tea is effective in preventing Alzheimer's-like damage in mice brains. Researchers note that in humans, merely drinking the herbal beverage would not bring about similar benefits. Researchers advise that a daily dosage of 1,500–1,600 mg of EGCG would be required in people to approximate the dosage that benefited the mice.

Muscle damage

Researchers at Baylor University, in a 2006 two-week study with college-age males, tested the ability of EGCG to prevent muscle damage after a physical exertion by heavy lifting. Researchers found that the men receiving the daily dosage of green tea extract had less muscle damage and soreness after heavy exertion than the control group.

Dental health

In addition to polyphenols, green tea contains several minerals, including fluoride and aluminum. The fluoride in green tea may be useful in fighting tooth decay. Green tea is also an antibacterial agent and can help to prevent gingivitis and periodontal disease by killing *E. coli* and streptococcus bacteria. This antibacterial action can also be effective in treating **halitosis**, or bad breath, by killing odor-causing bacteria.

Diabetes

In a study reported in 2006, Japanese researchers studied 17,413 men and women in 25 communities across the country. As many as half of the participants reported having type 2 diabetes. Researchers sought to discover the benefits of drinking green tea and coffee on development of type 2 diabetes. After a five-year follow up with participants, they found that those who reported drinking more green tea and coffee were less likely to get type 2 diabetes. The reliability of the outcome is limited by the accuracy of participants' reports about their tea and coffee consumption.

Preparations

Green tea leaves and tea bags can be purchased at most grocery, drug, and health food stores. It is graded by leaf size, with tea containing whole leaves and leaf tips considered the highest quality tea. Tea grades include Broken Orange, Pekoe, Broken Pekoe Souchong, Broken Orange Pekoe, Fannings, and Dust.

Although green tea is grown from a single plant, slight variations in tea processing (usually in the way the tea is rolled) have created a number of varieties of green tea. Popular green tea varieties include Gunpowder, Hyson, Dragonwell, Sencha, and Matcha.

Tea leaves should be kept in an air-tight container to retain flavor and prevent odors and moisture from being absorbed by the tea. It should also be stored in a cool place for no longer than six months before use.

The most common method of preparing green tea is as an infusion. The tea is mixed with boiling water, steeped for several minutes, and then strained or removed from the infusion before drinking. Approximately two teaspoons of loose tea, or a single tea bag, should be used for each cup of boiling water. A strainer, tea ball, or infuser can be used to immerse loose tea in the boiling water before steeping and separating it.

A second method of infusion is to mix loose tea with cold water first, bring the mixture to a boil in a pan or teapot, and then separate the tea from the infusion with a strainer before drinking.

Flavonoids—polyphenols with antioxidative properties—are released into the infusion as the tea steeps. The longer the steeping time, the more flavonoids are released by the tea leaves, although most will infuse into the water during the first five minutes of brewing. Longer steeping time also results in a higher **caffeine** content in the brewed tea.

Green tea leaves can be used in a poultice for treating insect **bites** and other skin irritations. Green

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tea leaves are chopped and boiled in water for two to three minutes. After the excess water is squeezed from the leaves, the green tea is applied to the area to be treated and wrapped in a bandage. Green tea also makes an effective astringent, and tea-soaked cloth or tea leaf poultice may help renew tired and puffy eyes.

The antibacterial activity of green tea also makes it appropriate for use in compresses for **cuts** and abrasions. A quick compress can be made by soaking a pad or bandage in hot tea, wringing out the excess fluid, and holding the pad firmly against the wound. Once the compress cools, the process can be repeated.

Precautions

The U.S. Food and Drug Administration (FDA) includes tea on its list of "Generally Recognized as Safe" substances. However, pregnant women and women who breast feed should consider limiting their intake of green tea because of its caffeine content. Caffeine can pass into breast milk and cause **sleep disorders** in nursing infants. Decaffeinated green tea is available that contains only trace amounts (5 mg or less) of caffeine. Women should check with their healthcare professional about drinking tea when they are pregnant or nursing.

Tea can stimulate the production of gastric acid, and individuals with ulcers may want to avoid drinking green tea for this reason. Those taking warfarin or any blood-thinning drugs should first consult with the physicians before consuming green tea, as it may counter the effects of the drug.

Side effects

Green tea contains caffeine, a central nervous system (CNS) stimulant that can cause restlessness, irritability, difficulty sleeping, **tremor**, heart palpitations, loss of appetite, and upset stomach. To avoid side effects, caffeine intake should be limited to 300 mg or less a day (the equivalent of 4–8 cups of brewed hot tea). Caffeine-free green tea preparations are available commercially.

The tannin in tea can cause **nausea** when drunk on an empty stomach and inhibit the absorption of non-heme **iron**. Individuals with iron-deficiency **anemia** who take iron supplements should avoid drinking green tea several hours before and after taking supplements. Iron absorption with tea can be increased by consuming foods rich in **vitamin C** with tea, such as a slice of lemon.

KEY TERMS

Antioxidants—Enzymes that bind with free radicals to neutralize their harmful effects.

Atherosclerosis—A type of arteriosclerosis, or hardening of the arteries, caused by fatty deposits of cholesterol and calcium that build up on the interior walls of the blood vessels and arteries.

Chemopreventative—A chemical or drug that is thought to prevent a disease.

Flavonoids—Polyphenol substances in tea that act as antioxidants.

Free radicals—Reactive molecules created during cell metabolism that can cause tissue and cell damage like that which occurs in aging and with disease processes such as cancer.

Gingivitis—Inflamed and bleeding gums caused by poor dental hygiene, respiratory diseases, and other disease processes.

Infusion—An herbal preparation made by mixing boiling water with an herb, letting the brew steep for 10 minutes, and then straining the herb out of the mixture.

Non-heme iron—Dietary or supplemental iron that is less efficiently absorbed by the body than heme iron (ferrous iron).

Periodontal disease—Disease of the gums and teeth. Symptoms include bleeding and receding gums, gingivitis, abscesses, and loose teeth.

Phytochemical—A naturally occurring chemical substance in a plant.

Polyphenols—Phytochemicals that act as an antioxidant, protecting cells against damaging free radicals.

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Paula Ford-Martin
Clare Hanrahan

Grippe *see* **Influenza**

Guggul

Description

The mukul **myrrh** tree, or *Commiphora mukul*, is small, thorny, and usually devoid of foliage. It grows naturally throughout India and Arabia. Guggul is the gum resin that comes from this tree, which belongs to the same genus as myrrh and has some similar components and actions. Guggul resin contains steroids, diterpenoids, alipathic esters, and carbohydrates. These factors appear to work together to exert the beneficial effects of this botanical.

Guggul has been traditionally used in **Ayurvedic medicine** to treat arthritis, inflammation, bone **fractures**, obesity, and disorders of lipid metabolism. One ancient Ayurvedic reference describes the power of guggul to treat "coating and obstruction of channels." This description stimulated further research into the properties of this **botanical medicine** for preventing and treating **atherosclerosis**, as well as other conditions resulting from high levels of lipids in the body.

General use

Guggul has been recommended for the treatment of arthritis, hypercholesterolemia, nodulocystic **acne**, and overweight. It is one of the primary therapeutic substances used in Ayurvedic medicine to prevent atherosclerosis, as well as one of the most promising herbs or supplements for the prevention and treatment of this condition. Studies in animals have documented not only the protective effects of guggul against atherosclerosis, but have shown actual regression of the condition in animals that already had it.

The active portion of the plant is the gum resin, which contains guggulsterone, a steroid compound. It appears to be effective in lowering blood levels of both total **cholesterol** and low-density lipoprotein (LDL) cholesterol. In trials lasting one to three months, cholesterol levels were reduced by 14–27% and triglycerides by 22–30%. These results are equal to or better than those of some conventional medications used to lower cholesterol, but with fewer side effects. There are several hypotheses to account for the effectiveness of guggul in decreasing serum lipids. It may decrease the production of cholesterol in the liver. Excretion of cholesterol and bile acids are increased, so that less fat and cholesterol are absorbed. Guggul also increases the production of thyroid hormones, which lower the levels of serum lipids. The lowering of serum lipids is what consequently decreases the risk of atherosclerosis. One of the most important ways that gugulipid lowers cholesterol may be by stimulating the liver to remove LDLs from the bloodstream. The effect on high-density lipoprotein (HDL) cholesterol is undetermined, as two studies yielded different conclusions. To lower cholesterol, one recommended dose of gugulipid is 100–500 mg taken daily. This dosage contains 25 mg of guggulsterone. It may take a month or so for the full effect to be experienced. Similar doses of gugulipid are used to promote weight loss.

The thyroid gland is stimulated by guggulsterone. This effect may play a role both in the ability of the substance to decrease cholesterol levels and to promote weight loss by increasing the body's rate of metabolism.

Guggulsterone has significant anti-inflammatory properties, although they are somewhat overshadowed by its effects on lipid metabolism. This finding supports its traditional use in the treatment of **rheumatoid arthritis** and other inflammatory conditions. Studies have shown guggulsterone to be at least as effective as the conventional medications phenylbutazone and ibuprofen (Advil, Motrin) for both acute and chronic types of inflammation in animal models.

Platelet stickiness appears to be reduced by guggul, which is desirable for decreasing the risk of coronary artery disease. Guggul may also promote fibrinolysis (dissolving the fibrin in **blood clots**) and act as an antioxidant. More research is warranted for

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KEY TERMS

Antioxidant— A substance that blocks the destructive action of free radicals.

Ayurveda—An ancient Indian system of holistic healing.

Embolism—Obstruction of a blood vessel by a loose clot.

Fibrinolysis—The breakdown of fibrin, an insoluble protein that is the end product of blood clotting. Fibrinolysis results in the dissolution of small clots.

Nodulocystic acne—A disorder of the sebaceous (oil-secreting) glands in which deep, and sometimes painful, cysts and pustules are formed.

these properties. They have potential benefits in the prevention of strokes and embolisms.

Studies have shown guggulsterone to have approximately the same effectiveness as the antibiotic tetracycline for the treatment of nodulocystic acne. It decreases inflammation and lowers the risk of recurrence of the condition. Guggul is also thought to have astringent, antiseptic, and antisuppurative (preventing pus formation) qualities that lend themselves to the treatment of this severe, and sometimes scarring, form of acne.

Preparations

In India, guggul has been a standard and approved treatment for high cholesterol since 1986. Guggul is most often available in tablet or capsule form, as a purified extract. Formulations should have a standardized concentration of guggulsterone. Most extracts contain from 5–10% guggulsterone. It is readily available in the United States, but available only by prescription, if at all, in the United Kingdom.

Gugulipid is also a component of some combination nutritional products that are being promoted for the support of normal metabolism of cholesterol and triglycerides. Other components may include **inositol** hexaniacinate, **chromium**, and vitamin **antioxidants**.

Precautions

Studies in both humans and animals have demonstrated a wide margin of safety and negligible toxicity for guggul, although some cases of liver toxicity have been reported for very high doses. Although it is apparently not toxic to the embryo or fetus either, guggul gum resin should not be used during **pregnancy** or lactation as it is thought to be a uterine stimulant.

Patients who are taking prescribed medications for **heart disease** should use caution in taking this herb.

Side effects

Crude extracts of guggul are more likely to produce side effects than purer products. In the past, effects included loss of appetite, abdominal **pain**, **diarrhea**, and **rashes**. In studies using purer extracts, significant adverse effects have not occurred. **Headache** and mild **nausea** are sometimes reported.

Interactions

Guggul can be problematic for people being treated for thyroid conditions. Since guggul stimulates production of thyroid hormone, it may alter the dosage requirements for thyroid replacement medication. It can also reduce the availability and effectiveness of the heart medications propranolol (Inderal) and diltiazem (Cardizem). Patients should consult a health care practitioner before taking guggul along with any other herbs or medications.

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Judith Turner

Guided imagery

Definition

Guided imagery is the use of **relaxation** and mental visualization to improve mood and/or physical well-being.

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Benefits

The connection between the mind and physical health has been well documented and extensively studied. Positive mental imagery can promote relaxation and reduce **stress**, improve mood, control high blood pressure, alleviate **pain**, boost the immune system, and lower **cholesterol** and blood sugar levels. Through guided imagery techniques, patients can learn to control functions normally controlled by the autonomic nervous system, such as heart rate, blood pressure, respiratory rate, and body temperature.

One of the biggest benefits of using guided imagery as a therapeutic tool is its availability. Imagery can be used virtually anywhere, anytime. It is also an equal opportunity therapy. Although some initial training in the technique may be required, guided imagery is accessible to virtually everyone regardless of economic status, education, or geographical location.

Guided imagery also gives individuals a sense of empowerment, or control. The technique is induced by a therapist who guides the patient. The resulting mental imagery used is solely a product of the individual's imagination. Some individuals have difficulty imagining. They may not get actual clear images but perhaps vague feelings about the guided journey. However, these individuals' brains and nervous systems responses seem to be the same as those with more detailed imaginings.

Patients who feel uncomfortable "opening up" in a traditional therapist-patient session may feel more at ease with a self-directed therapy like guided imagery.

Description

Guided imagery is simply the use of one's imagination to promote mental and physical health. It can be self-directed, where the individual puts himself into a relaxed state and creates his own images, or directed by others. When directed by others, an individual listens to a therapist, video, or audiotaped exercise that leads him through a relaxation and imagery exercise. Some therapists also use guided imagery in group settings.

Guided imagery is a two-part process. The first component involves reaching a state of deep relaxation through breathing and muscle relaxation techniques. During the relaxation phase, the person closes her eyes and focuses on the slow, in and out sensation of breathing. Or, she might focus on releasing the feelings of tension from her muscles, starting with the toes and working up to the top of the head. Relaxation tapes often feature soft music or tranquil, natural sounds such as rolling waves and chirping birds in order to promote feelings of relaxation.

KEY TERMS

Aromatherapy—The therapeutic use of plant-derived, aromatic essential oils to promote physical and psychological well-being.

Autonomic nervous system—The part of the nervous system that controls so-called involuntary functions such as heart rate, salivary gland secretion, respiratory function, and pupil dilation.

Once complete relaxation is achieved, the second component of the exercise is the imagery, or visualization, itself. There are a number of different types of guided imagery techniques, limited only by the imagination. Some commonly used types include relaxation imagery, healing imagery, pain control imagery, and mental rehearsal.

Relaxation imagery

Relaxation imagery involves conjuring up pleasant, relaxing images that rest the mind and body. These may be experiences that have already happened, or new situations.

Healing imagery

Patients coping with diseases and injuries can imagine **cancer** cells dying, **wounds** healing, and the body mending itself. Or, patients may picture themselves healthy, happy, and symptom-free. Another healing imagery technique is based on the idea of *qi*, or energy flow, an idea borrowed from **traditional Chinese medicine**. Chinese medicine practitioners believe that illness is the result of a blockage or slowing of energy flow in the body. Individuals may use guided imagery to imagine energy moving freely throughout the body as a metaphor for good health.

Pain control imagery

Individuals can control pain through several imagery techniques. One method is to produce a mental image of the pain and then transform that image into something less frightening and more manageable. Another is to imagine the pain disappearing, and the patient as completely pain-free. Or, one may imagine the pain as something over which he has complete control. For example, patients with back problems may imagine their pain as a high voltage electric current surging through their spine. As they use guided imagery techniques, they can picture themselves reaching for an electrical switch and turning down the power on the current to alleviate the pain.

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MARTIN ROSSMAN (1945-)

Martin L. Rossman received his B.A. and M.D. degrees from the University of Michigan in Ann Arbor. The Colorado native then set up practice in San Francisco, where he is a Clinical Associate in the Department of Medicine at the University of California Medical Center as well as director and founder of the Collaborative Medicine Center in Mill Valley, and Co-Director of the Academy for Guided Imagery, also in Mill Valley. Dr. Rossman has been a Diplomat of Acupuncture for the National Commission for the Certification of Acupuncturists since 1986, and, since 1989, has been certified for Interactive Guided Imagery through the Academy for Guided Imagery. He also serves as a member of various medical-related associations throughout the United States.

According to Rossman, imagination is the key to understanding the self, and can be used to resolve many issues of mind and body fitness, including stress. Rossman prefers the term complementary medicine to alternative medicine, noting that so many of the therapies have moved into the medical mainstream that they all play a crucial role in health. Rossman's book, *Healing Yourself: A Step-by-Step Program for Better Health Through Imagery,* is one of many writings he has done on imagery. Rossman is a popular speaker in both professional and public settings, and a television and radio personality discussing the virtues of imagery, acupuncture, and other holistic treatments.

He can be reached through The Collaborative Medicine Center, Mill Valley, California at (415) 383-3197 or through the Academy for Guided Imagery in Mill Valley at (800) 726- 2070.

Mental rehearsal

Mental rehearsal involves imagining a situation or scenario and its ideal outcome. It can be used to reduce **anxiety** about an upcoming situation, such as labor and delivery, surgery, or even a critical life event such as an important competition or a job interview. Individuals picture themselves going through each step of the anxiety-producing event and then successfully completing it.

Preparations

For a successful guided imagery session, individuals should select a quiet, relaxing location where there is a comfortable place to sit or recline. If the guided imagery session is to be prompted with an audiotape or videotape, a stereo, VCR, or portable tape player should be available. Some people find that quiet background music improves their imagery sessions.

The session, which can last anywhere from a few minutes to an hour, should be uninterrupted. Taking the phone off the hook and asking family members for solitude can ensure a more successful and relaxing session.

Imagery combined with other relaxation techniques such as **yoga**, massage, or **aromatherapy** can greatly enhance the effects of these therapies. It can be done virtually anywhere.

Precautions

Because of the state of extreme relaxation involved in guided imagery, individuals should never attempt to use guided imagery while driving or operating heavy machinery.

Side effects

Guided imagery can induce sleepiness, and some individuals may fall asleep during a session. Other than this, there are no known adverse side effects to guided imagery.

Research and general acceptance

Use of guided imagery is a widely accepted practice among mental healthcare providers and is gaining acceptance as a powerful pain control tool across a number of medical disciplines. Results of a study conducted at The Cleveland Clinic Foundation and published in 1999 found that cardiac surgery patients who used a guided imagery tape prior to surgery experienced less pain and anxiety. These patients also left the hospital earlier following surgery than patients who used pain medication only.

Another study conducted by Harvard Medical School researchers found that for more than 200 patients undergoing invasive vascular or renal surgery, guided imagery controlled pain and anxiety more effectively than medication alone.

Training and certification

Guided imagery is used by many licensed therapists, counselors, psychologists, and psychiatrists. There are many self-help books, audiotapes, and videos available that offer instruction in guided imagery techniques.

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Paula Ford-Martin

Gulf War syndrome

Definition

Gulf War syndrome describes a wide spectrum of illnesses and symptoms ranging from **asthma** to **sexual dysfunction** that have been reported by U.S. and U.S. allied soldiers who served in the Persian Gulf War in Operation Desert Shield, Operation Desert Storm, and Operation Iraqi Freedom.

Description

Hundreds of federally funded research studies on Gulf War-related illnesses have been undertaken at a cost of hundred of millions of dollars. Despite this investment and the data collected from veterans who have registered with the Department of Defense and/or Veterans Administration (VA) as having Gulf War-related illnesses, there is still much debate over the existence of Gulf War syndrome. Veterans believed to have the illness experience a wide range of debilitating symptoms that elude a single diagnosis. These symptoms include **fatigue**, trouble breathing, headaches, poor sleep, forgetfulness, and trouble concentrating. Similar experiences among Gulf War veterans have been reported in the United Kingdom and Canada.

Causes and symptoms

As of 2008 the possible causative agent for Gulf War syndrome other than the **stress** of warfare was much debated. The VA and other public and private institutions have investigated a wide range of potential factors. These include chemical and biological weapons, the immunizations and preventive treatments used to protect against them, smoke from oil well fires, exposure to depleted uranium, and diseases endemic to the Arabian peninsula. As of 2008, investigators had not approached a consensus. They even disagreed on the likelihood that a specific agent is responsible, as a combination of these risk factors may have negative health consequences. There is a likelihood that sarin and/or cyclosarin (nerve gases) were released during the destruction of Iraqi munitions at Kharnisiyah, Iraq; however, veterans who served in that area were not found to have a higher rate of illness than veterans serving in the Persian Gulf in general.

Statistical analysis shows that the following symptoms are about twice as likely to appear in Gulf War veterans than in their non-combat peers: **depression**, posttraumatic stress disorder (PTSD), chronic fatigue, cognitive dysfunction (diminished ability to calculate, order thoughts, evaluate, learn, and remember), **bronchitis**, asthma, **fibromyalgia**, alcohol abuse, **anxiety**, and sexual dysfunction. PTSD is the modern equivalent of shell shock (the term used in World War I) and battle fatigue (World War II). It encompasses most of the psychological symptoms of war veterans, including nightmares, panic at sudden loud noises, and inability to adjust to peacetime living.

Chronic fatigue syndrome has a specific medical definition that attempts to separate common fatigue from a more disabling illness in hope of finding a specific cause. Fibromyalgia is another newly defined syndrome, and as such it has arbitrarily rigid defining characteristics. These include a certain duration of illness, a specified minimum number of joint and muscle pains located in designated areas of the body, sleep disturbances, and other associated symptoms and signs. One study comparing unexplained symptoms in Gulf War veterans with symptoms in control subjects found that over half the veterans with unexplained muscle **pain** met the criteria for fibromyalgia, and a significant portion of the veterans with unexplained fatigue met the criteria for chronic fatigue syndrome. Amyotrophic lateral sclerosis (ALS), also known as **Lou Gehrig's disease**, also occurs more frequently in veterans of the Gulf Wars. Gulf War veterans are twice as likely as other veterans to develop ALS, which causes wasting of muscle tissue and is fatal within three to five years.

Researchers identified three distinct syndromes and several variations in Gulf War veterans. Type one

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patients suffer primarily from impaired thinking. Type two patients have a greater degree of confusion and ataxia (loss of coordination). Type three patients are the most affected by joint pains, muscle pains, and extremity paresthesias (unnatural sensations such as burning or tingling in the arms and legs). In each of the three types, researchers found different but measurable impairments on objective testing of neurological function. The functioning of the nervous system is much more complex and subtle than other body systems. Measuring it requires an equally complex effort. The tests used in this study carefully measured and compared localized nerve performance at several different tasks against the same values in normal subjects. Brain wave response to noise and touch, eye muscle response to spinning, and caloric testing (stimulation of the ear with warm and cold water, which causes vertigo) were clearly different between the normal and the test subjects. The researchers concluded that there must be a generalized injury affecting the nervous system. Another research group concluded that there was a neurologic injury involving the central, peripheral, and autonomic nervous systems.

After many years of vigorous study, the VA concluded that the signs and symptoms experienced by veterans believed to have Gulf War syndrome are real but that there is no unexplained, underlying single disease or condition affecting the veterans. Although some veterans do have unexplained, undiagnosed illnesses, this does not occur at a rate greater than that of the general population. They have also concluded that there was no area of deployment more likely than any other to produce veterans with the symptoms of Gulf War syndrome. This finding, however, remained extremely controversial. Many people believe that there is an underlying common condition, and many scientists continued as of 2008 doing research to determine if there was a common condition, and if so what the underlying cause may be.

Diagnosis

As there is no clear definition of the disease, diagnosis is primarily an exercise in identifying those Gulf War veterans who have an undefined illness in an effort to learn more about them and their symptoms. Both the Department of Defense (DoD) and the VA have programs devoted to this problem. Both the DoD Comprehensive Clinical Evaluation Program and the VA Persian Gulf Registry provide free, in-depth medical evaluations of Gulf War veterans and their families. In addition to providing individual veterans with critical medical care, these organizations use the cumulative data from these programs to advance research on diseases and disorders more likely to occur in the veteran community.

KEY TERMS

Ataxia—Lack of coordination.

Caloric testing—Flushing warm and cold water into the ear stimulates the labyrinth and causes vertigo and nystagmus (involuntary movement of the eyes in a horizontal direction) if all the nerve pathways are intact.

Endemic—Belonging or native to a particular locality or people.

Paresthesia—An abnormal sensation often described as burning, numbness, tingling, or pin pricks.

Syndrome—Common features of a disease or features that appear together often enough to suggest they may represent a single, as yet unknown, disease entity. When a syndrome is first identified, an attempt is made to define it as strictly as possible, even to the exclusion of some cases, in order to separate out a pure enough sample to study. This process is most likely to identify a cause, a positive method of diagnosis, and a treatment.

Treatment

There is no specific treatment for Gulf War syndrome. Treatment mainly focuses on relieving the symptoms experienced by each individual. The overall key to successful treatment is long-term, ongoing care, which may include medication, **hypnotherapy**, **acupuncture**, **homeopathy**, **nutrition**, vitamin/mineral therapy, and bodywork.

Allopathic treatment

There are many drugs available for symptomatic relief. Psychological counseling by those specializing in this area can be immensely beneficial, even life-saving, for those contemplating suicide. Veterans' benefits are available for those who are impaired by their symptoms.

Expected results

The outlook for war veterans was unclear as of 2008, but improvement was hoped for as more information was gathered about the illness. Gradual return to a functioning life may take many years of work and much help. However, even in the absence of an identifiable and curable cause, recovery is possible.

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Office of the Special Assistant for Gulf War Illnesses, Four Skyline Place, 51113 Leesburg Pike, Suite 901, Falls Church, VA, 22041, (800) 497-6261, www.gulflink.osd.milc.

Paula Ford-Martin
Rebecca J. Frey, PhD

Gum disease

Definition

Gum disease, also called periodontal disease, is defined as the inflammation of the structures that surround and support the teeth. If left untreated, gum disease may progress to the point where there is destruction of the jawbone. It is one of the most common causes of tooth loss. Periodontal disease is also a risk factor for coronary **heart disease** and preterm low birth weight.

Description

Gingivitis is the earliest stage of a gum infection. It may recur or even become chronic. If gingivitis is not treated properly, it may progress to periodontitis, an inflammation of the periodontal ligament that helps hold the teeth in the bone. Periodontitis is sometimes called pyorrhea, which means a pus discharge.

Chronic periodontis results in the inflammation within the supporting tissues of the teeth, leading to progressive loss of tissue attachment and bone. It is the most frequent form of periodontis and is characterized by pocket formation and receding gum tissue.

Aggressive periodontis is a highly destructive form that causes rapid loss of tissue attachment and jawbone destruction. It often occurs in patients who are otherwise healthy.

Necrotizing periodontal diseases—also known as necrotizing ulcerative gingivitis or Vincent's infection—are **infections** characterized by gingival tissue death, and loss of tissue attachment and bone.

Severe cases of periodontitis may affect the jawbone. Severe sudden onset of gum disease is known as trench mouth. It is caused by an infection of both spirochetes and fusiform bacilli. It was once a major problem for soldiers during World War I. In the late 2000s, trench mouth is particularly common among teenagers and young adults under **stress**, often at examination time. Inflammation from trench mouth can also spread to nearby tissues of the face and neck.

Causes and symptoms

Causes

By far, the most common cause of gum disease is poor dental hygiene. Regular daily brushing and flossing of the teeth generally clears away food and bacteria buildup in the mouth. If the teeth are neglected, bacteria collect, and plaque forms on the teeth and gums. If the plaque is not removed, it mixes with saliva and hardens into tartar. Tartar irritates the gums and causes them to shrink away from the teeth, opening up spaces where more bacteria and plaque can collect. This cycle encourages increasingly severe inflammation and infection.

The mechanisms by which bacteria cause tissue destruction in advanced gum disease are not fully understood. Several bacterial products that diffuse through tissue are thought to play a role in gum disease. Toxins produced by some bacteria can kill cells. Studies show that the amount of endotoxin present correlates with the severity of periodontal disease. Other bacterial products include proteolytic enzymes, which are molecules that digest protein found in cells, thereby causing cell destruction. The human immune response has also been implicated in tissue destruction. As part of a normal immune response, white blood cells enter regions of inflammation to destroy

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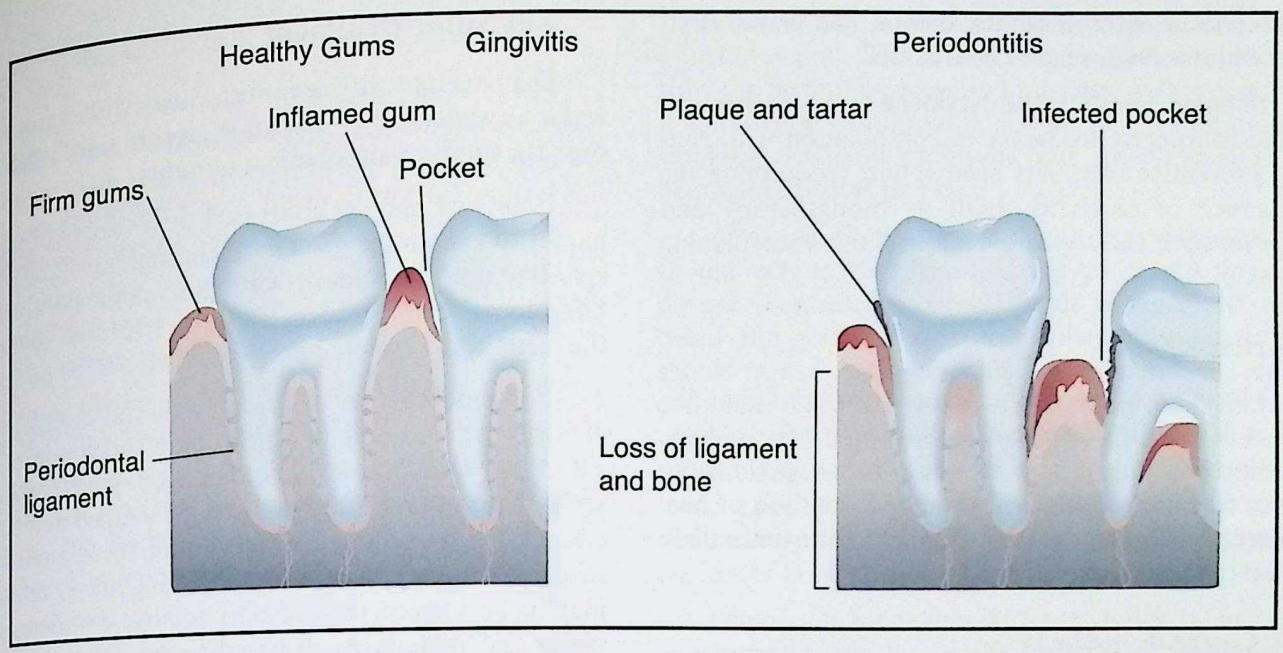

Healthy gums support the teeth. When gingivitis goes untreated, the gums become weak and pockets form around the teeth. Plaque and tartar build up in the pockets, the gum recedes, and periodontitis occurs. *(Illustration by Argosy, Inc. Cengage Learning, Gale)*

bacteria. In the process of destroying bacteria, periodontal tissue is also destroyed.

Other factors can contribute to the development of gum disease. Patients who have a family history of tooth loss or periodontal disease have an increased risk of developing the condition. Smokers and tobacco users are more than two times as likely as nonsmokers to develop gum disease. Hormone levels contribute to the development of bacteria in the mouth. **Pregnancy**, puberty, **menopause**, and the use of oral or injectable contraceptives may create a climate that promotes the development of gum disease. Additional factors include **diabetes mellitus**, scurvy, pellagra, **allergies**, **leukemia**, **Crohn's disease**, **AIDS**, chemotherapy, nutritional deficiencies, hydrochloric acid deficiency, poorly fitted fillings, radiation treatments, and exposure to heavy metals (mercury, lead, arsenic, and nickel). Medications that may contribute to the development of gum disease include steroids; phenytoin for controlling seizures; cyclosporine, which is taken by people who have had organ transplants; certain **cancer** drugs; and the **calcium** channel blockers used to control blood pressure and heartbeat.

Symptoms

The main symptoms of gingivitis are dark red, swollen, and tender gums that bleed easily. **Pain** is usually minimal. People with periodontitis have the same symptoms. In addition they may also have pain, loose teeth, and persistent bad breath. Abscesses and pus may develop. The symptoms of trench mouth include sudden onset of illness accompanied by pain, bleeding gums, bad breath, and a grayish mucus that covers the gums.

Diagnosis

A dental examination and history are taken. As the disease progresses, a dentist will be able to find hollowed pockets near the gums upon examination with a periodontal probe that gently measures the depth of the pockets surrounding each tooth. Dental x rays may be used to reveal the breakdown of bone. A smear of the gum area may be taken to determine the existence of any bacterial infections. The visualization of spirochetes can be used to confirm the diagnosis of trench mouth.

Treatment

Naturopathic treatment

Zinc, **copper**, **folic acid**, **vitamin E**, **selenium**, and **vitamin A** or beta-carotene are very helpful in slowing the progression of gum disease, especially if the patient has dietary deficiencies. Daily CoQ10 supplementation is also recommended. Mouthwashes that contain either a 0.1% folate solution or a 5% solution of zinc, or both, swished in the mouth and held there for at least a minute, can be taken twice daily.

Flavonoids help reduce inflammation and strengthen the gum tissue. A daily menu that includes foods rich in flavonoids is recommended. These foods include

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blueberries, **hawthorn** berries, onions, and grapes. Extracts of these foods may be used as well.

Supplementation with **lycopene** (a phytochemical found in tomato products), in combination with routine preventive care, has been found to decrease the occurence of gingivitis, both as monotherapy and as adjunctive therapy after scaling and root planing procedures.

Homeopathy

The main homeopathic remedy for mild gum disease is *Mercurius solubilis hahnemanni* in a 6c potency. *Natrum muriaticum,* also in a 6c potency, is for more severe disease, especially if there is formation of pus. Homeopathic remedies can be taken four times daily for up to three days.

Ayurvedic medicine

Ayurvedic practitioners recommend a daily cup of water with the juice of a fresh lemon squeezed into it for bleeding gums. Five grams of amla powder in a cup of water daily is also recommended. The teeth can be brushed with catechu or **neem** powder or both.

Traditional Chinese medicine

According to **traditional Chinese medicine**, the gums are nourished by the liver's function. If the level of toxins in the body exceeds the liver's blood-cleansing limits, eventually the gums (and other parts of the body) become a breeding ground for disease. The Chinese also consider the liver as a reservoir of blood; it ensures that adequate blood and Qi (vital energy) are delivered to the muscles, gums, and joints.

Herbal therapies

The teeth can be brushed with a mixture of baking soda and hydrogen peroxide to clean them thoroughly and to fight infection. **Goldenseal** root powder, *Hydrastis canandensis,* can be used in the same way. **Myrrh**, *Commiphora molmol,* can be applied directly to the gums. *Aloe vera* may be applied directly to the gums to reduce pain and inflammation. In addition, a cup of water with a teaspoon of **apple cider vinegar** makes a good daily mouth rinse. An herbal mouth rinse can be prepared from 1 oz hydrastis, 1 oz myrrh, and 1 pint of water. Herbal mouthrinse preparations containing **chamomile**, **echinacea**, myrrh, mint, **sage**, and ratania have been shown to reduce inflammation. Gum products containing oligomeric proanthocyanidins have been shown to have antioxidant and anti-inflammatory properties to relieve symptoms and promote oral health.

Allopathic treatment

Dentists may advise mouth rinses with warm salt water as well as measures for symptom relief, such as over-the-counter anesthetic ointments.

Bone loss may be addressed by a variety of techniques to encourage growth, including bone grafting, splinting, and bite guards or other appliances to stabilize loose teeth. In some cases of advanced disease, the teeth in the affected areas may have to be pulled.

For moderate to severe periodontal disease, the dentist may recommend a procedure called nonsurgical root planing in which damaged gum tissue is scraped away and root surfaces are scraped and deep cleaned. If the gums are badly damaged, gum flap surgery (called excisional new attachment procedure) may be performed to surgically remove diseased gum tissue and underlying diseased tissue. Root surfaces are scraped and sutures are used to repair and tighten the gum tissue.

A less invasive laser technique is available, called laser-assisted new attachment procedure (LANAP). This technique, approved by the U.S. Food and Drug Administration, uses a laser instead of a scalpel to clean away diseased tissue without the need for cutting or stitching. The procedure is less painful with a faster recovery than the excisional technique, as well as a greater predictability for reattachment of gum tissue and bone growth.

Any underlying medical conditions should be assessed and treated, as they may be contributing to the gum disease. Such dental problems as poorly aligned teeth or grinding of the teeth may need to be addressed. **Nutrition** should be improved. If a severe infection such as trench mouth is present, antibiotics are given. The antibiotics may be delivered directly to the infected gum and bone tissues to ensure that high concentrations of the antibiotic reach the infected area.

Physicians have found that the importance of treating serious gum infections with antibiotics spreads from the mouth to affect general health. By looking for markers of inflammation throughout the body after treating some patients with gum infections with antibiotics, and not treating others, researchers have found oral bacteria from gum infections in arterial plaque.

Infected abscesses, especially of bone, are difficult to treat and require long-term antibiotic treatment to prevent recurrence of infection. Patients with gum disease should be reevaluated after three months to assess progress and further treatment needs.

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KEY TERMS

Azole—Any member of a group of chemical compounds with five-membered rings containing one or more nitrogen atoms. Several azoles are used as antifungal medications.

Bentonite clay—A green clay of aluminum silicate containing magnesium and trace minerals. The clay can draw out agents of infection.

Dermatophyte—A type of fungus that is parasitic on skin and causes a skin disease.

Gingivitis—A mild form of periodontal disease that causes the gums to become red, swollen, and bleed easily. The condition can be treated with good oral care and with professional treatment.

Spirochetes—A type of spiral-shaped bacteria.

Sulcus—A v-shaped crevice where the gum line meets the teeth. A healthy sulcus measurement is 3 mm. As gum tissues become diseased, this crevice can measure 6 mm and above, allowing bacteria to develop.

Tinea—Any of several fungal infections of the skin, especially ringworm.

Expected results

With good dental habits, most simple cases of gum disease resolve. If the teeth and gums are not cared for or if the disease progresses for other reasons, there may be destruction of bone and a loss of teeth. Research indicates that the bacteria connected with plaque formation and chronic gum disease may enter the bloodstream and cause an infection that may bring on heart disease, **pneumonia**, or premature births.

Prevention

The teeth should be brushed with a fluoride toothpaste and flossed daily, after meals. An antiseptic rinse should be used after brushing and flossing to reduce bacteria. Fifteen minutes per day should be spent massaging the gums with **eucalyptus**, **witch hazel**, or vitamin E, rubbing a finger in a circular motion along the gum line. Toothbrushes should be changed monthly, since there may be a tendency for bacteria to accumulate on them. The toothbrush should also be soft to avoid further injury to the gums. A dentist should regularly check the health of the gums and teeth of people who are prone to gum disease. A dental hygienist should clean the teeth regularly, especially if there is an increased tendency to form plaque.

Patients who smoke or chew tobacco should make efforts to quit. Chemicals from cigarette smoke can slow the healing process and interfere with treatment. A physician can provide a referral to community **smoking** cessation programs and other resources to help patients quit smoking.

A whole foods diet is highly recommended. It should include fresh fruit and vegetables and plenty of dietary fiber. Such processed foods as sugar and white bread and grains contribute to plaque formation and should be avoided. Foods high in **vitamin C** should be consumed daily. Vitamin C is important in maintaining healthy gums, and supplementation may also be needed. As smoking reduces vitamin C absorption, the use of tobacco products should be avoided. Calcium and **magnesium** supplementation is recommended to minimize the loss of bone in progressive gum disease.

Behavioral management approaches to increase adherence to oral hygiene instructions may improve oral hygiene-related behaviors, but further research is needed in this area to determine exact effects.

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Academy of General Dentistry, 211 East Chicago Ave., Suite 900, Chicago, IL, 60611-1999, (888) AGD-DENT, http://www.agd.org.

Academy of Laser Dentistry, PO Box 8667, Coral Springs, FL, 33075, (877) 527-3776, (954) 346-3776, http://www.laserdentistry.org.

American Dental Association, 211 East Chicago Ave., Chicago, IL, 60611-2678, (800) 947-4746, http://www.ada.org.

Patience Paradox
Teresa G. Odle
Angela M. Costello

Gymnema

Description

Gymnema (*Gymnema sylvestre*) is a climbing plant that grows in the tropical forests of central and southern India. The woody gymnema plant also grows

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in parts of Africa. Leaves of this long, slender plant have been used for more than 2,000 years in India to treat diabetes. Gymnema is also known as gurmar, gurmabooti, periploca of the woods, and meshasringi (ram's horn).

General use

In the past, powdered gymnema root was used to treat snakebites, **malaria**, coughs, **constipation**, stomach complaints, water retention, and liver disease. However, the Hindu word gurmar best describes the primary use of gymnema. Gurmar means "sugar destroyer," and it has been used in **Ayurvedic medicine** for thousands of years to treat adult-onset diabetes, a condition once described as "honey urine."

The plant's sugar-destroying property was thought to be released when a person chewed on one or two leaves. Gymnema was said to paralyze a person's tongue to the taste of sugar and bitter tastes. That taste-blocking reaction lasted for several hours. During that time, leaves supposedly provided a slight block to the taste for salty foods, while the taste for acidic foods was not affected.

By blocking the taste buds from tasting sugar, gymnema blocked sugar in the digestive system, resulting in a decrease in blood sugar, also known as a hypoglycemic effect. This medicinal action has been studied since the 1930s.

Gymnema and diabetes

Diabetes is a condition characterized by high levels of sugar (glucose) in the blood. The glucose is affected by insulin, a hormone created by the pancreas. Insulin is necessary for cells to utilize glucose. Type I diabetes, or juvenile diabetes, is caused by the body's inability to produce enough insulin. Type II diabetes, or adult-onset diabetes, is caused by the body's inability to adequately process insulin. Frequently, the pancreas creates much more insulin than the body requires.

Type I diabetes is also called insulin-dependent **diabetes mellitus**, and Type II diabetes is known as non-insulin-dependent diabetes mellitus. In India, gymnema has been used by both Type I and Type II diabetics.

Contemporary uses of gymnema

Gymnema has been used in folk medicine as a remedy for diabetes, **allergies**, urinary tract inflections, **anemia**, hyperactivity, digestion, **cholesterol** management, and weight control. Most of those treatments did not prove to be effective. However, some studies of rats and mice indicated that gymnema might lower LDL (low-density lipoprotein), which is also known as bad cholesterol. As of early 2008, there were few controlled studies into the effectiveness of gymnema in treating cholesterol in humans.

Research on humans into the use of gymnema for treating diabetes progressed to the double-blind randomized trial stage, according to information posted on the United States National Institutes of Health Web site. The trial that started in India in January 2007 compared the glucose-lowering effect of gurmar (gymnema) with metformin, a prescription drug widely prescribed to control blood sugar. The trial intended to study 100 people whose Type II diabetes was recently detected. The study was open to men and women between the ages 25 and 70.

A possible weight-loss remedy

Although gymnema will not make sugary foods taste bad, the sugar destroyer has been said to curb the desire for sweets. Due to this sugar-blocking property, gymnema is marketed as a weight-loss remedy that people take to help fight the desire for sweet treats. As a weight-loss remedy, gymnema has not been studied extensively. Some in the medical community were dubious about its effectiveness. Instead, the sugar destroyer was acknowledged as a potential treatment for diabetes.

Preparations

In studies of humans involving the use of gymnema to control blood sugar, the daily dosage frequently ranged from 400 mg to 600 mg. The strength of commercial gymnema products varies, so a person should follow the directions on the package.

Gymnema is available commercially in various forms, including capsules, tinctures, and powdered herb. The capsule dosage is usually approximately 250–400 mg per day. Tinctures consist of a liquid such as alcohol and gymnema leaf extract. Tinctures include a product containing 300 mg of gymnema. A 1 ml dosage is mixed into water and consumed once or twice daily.

Gymnema is also available in powdered form. The recommended dosage for powdered gymnema leaves is 0.5–1 tsp (2–4 g) per day. An herbal tea can be prepared by pouring 1 cup (240 ml) of boiling water over the powdered leaves. The mixture is covered and steeped for 10–15 minutes. The tea is strained before it is consumed.

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Precautions

The United States Food and Drug Administration (FDA) does not regulate herbal remedies such as gymnema, which means the FDA has not indicated if the remedies have been proven to be safe or effective. Furthermore, ingredients are not standardized to comply with regulations.

The safety of gymnema has not been established for use by children, pregnant women, and nursing mothers. In addition, safety has not been determined for people with severe kidney and liver diseases.

Before beginning any herbal treatment, people should consult a physician or health practitioner. Consulting a medical professional is particularly important before taking gymnema because the remedy could potentially lower blood sugar too much, resulting in a hypoglycemic reaction.

It is especially important for diabetics to consult with a doctor. Gymnema should not be regarded as a substitute for other medications, including insulin. Diabetics take insulin to control their blood sugar; they cannot replace the hormone with gymnema.

In addition, diabetes can go undetected for some time. It may not be diagnosed until a person goes to a doctor after experiencing symptoms such as frequent urination, **dizziness**, and **fatigue**. Diabetes must be treated medically since complications from untreated diabetes include kidney failure, **heart disease**, blindness, and loss of limbs.

Side effects

Gymnema could possibly lower the level of blood sugar, placing the diabetic at risk for **hypoglycemia**.

Interactions

Gymnema could interact with insulin and prescription medications and herbal remedies taken to reduce blood sugar levels. Taking gymnema could cause the drugs or herbals to work better, resulting in hypoglycemia. Diabetes-management drugs include metformin, glipizide, and glyburide. Herbal remedies that could trigger a reaction include **fenugreek**, **kudzu**, and large amounts of **ginger**.

Furthermore, the effects of cholesterol-lowering drugs and remedies could be increased for a person who also takes gymnema.

KEY TERMS

Ayurvedic medicine—Ayurveda is the Sanskrit word for the science of life and longevity. The Ayurvedic treatment is based on the theory that health is a balance between the physical, emotional, and the spiritual.

Glucose—Blood sugar.

Hypoglycemia—Low blood sugar.

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American Diabetes Association, 1701 N. Beauregard St., Alexandria, VA, 22311, (800) 342-2383, http://www.diabetes.org.

Herb Research Foundation, 4140 Fifteenth St., Boulder, CO, 80304, (303) 449-2265, http://www.herbs.org.

Liz Swain
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Gypsywort *see* **Bugleweed**

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H

Hair loss

Definition

Hair loss, or *alopecia*, is total or partial baldness caused by hormonal changes or physical or mental stress.

Description

Hair loss occurs for many reasons. Some causes, such as hormonal changes, are considered natural, while others signal serious health problems. Some conditions are confined to the scalp, while others reflect disease processes throughout the body.

Causes and symptoms

Androgenetic alopecia occurs in both men and women, and is considered normal in adult males. Also known as male pattern baldness, it is easily recognized by the distribution of hair loss over the top and front of the head (leaving a horseshoe pattern of hair) and by the healthy condition of the scalp. Women with androgenetic alopecia experience hair thinning, particularly over the top of the scalp. The disorder is thought to be caused by a genetic predisposition that triggers the production of certain enzymes that convert testosterone into the hormone dihydrotestosterone (DHT). DHT is known to shrink hair follicles, and can cause partial or complete hair loss.

Alopecia areata and *alopecia circumscripta* refer to hair loss conditions that can be patchy or extend to complete baldness. The exact cause of alopecia areata is unknown, but it is thought to be triggered by an immune system disorder.

Oftentimes, conditions affecting the skin of the scalp will result in hair loss. The first clue to the specific cause is the pattern of hair loss, whether it be complete baldness (*alopecia capitis totalis*), patchy bald spots, thinning, or hair loss confined to certain areas. Also a factor is the condition of the hair and the scalp beneath it. Sometimes only the hair is affected; sometimes the skin is visibly diseased as well.

Fungal infections of the scalp usually cause patchy hair loss. The fungus, similar to the ones that cause **athlete's foot** and ringworm, often glows under ultraviolet light.

Complete hair loss is a common result of **cancer** chemotherapy, due to the toxicity of the drugs used. Placing a tourniquet around the skull just above the ears during the intravenous infusion of the drugs may reduce or eliminate hair loss by preventing the drugs from reaching the scalp. However, this technique may not be recommended in the treatment of certain types of cancer. An investigational topical gel that may prevent chemotherapy-related hair loss, known as GW 8510, was in clinical trials as of April 2000.

Systemic diseases often affect hair growth either selectively or by altering the skin of the scalp. One example is thyroid disorders. **Hyperthyroidism** (too much thyroid hormone) causes hair to become thin and fine. **Hypothyroidism** (too little thyroid hormone) thickens both hair and skin. Several autoimmune diseases also affect the skin and potentially the hair, notably lupus erythematosus.

Hair loss can also be caused by *trichotillomania*, a mental disorder or compulsion that causes a person to pull out his/her own hair. In some individuals severe mental or physical stress can cause hair loss, including major surgery or illness, significant life changes (i.e., divorce, death of a loved one), and drastic dietary changes. This type of hair loss is called *Telogen effluvium*, and is the second most common type of hair loss.

Diagnosis

Dermatologists are skilled in diagnosis by sight alone. For more obscure diseases, they may have to resort to a skin biopsy, removing a tiny bit of skin using a local anesthetic so that it can be examined

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KEY TERMS

Athlete's foot—A fungal infection between the toes, officially known as tinea pedis.

Autoimmune disease—Certain diseases caused by the body's development of an immune reaction to its own tissues.

Chemotherapy—The treatment of diseases, usually cancer, with drugs (chemicals).

Hair follicles—Tiny organs in the skin, each one of which grows a single hair.

Lupus erythematosus—An autoimmune disease that can damage skin, joints, kidneys, and other organs.

Ringworm—A fungal infection of the skin, also known as tinea corporis.

Systemic—Affecting all or most parts of the body.

under a microscope. Systemic diseases will require a complete evaluation by a physician, including specific tests to identify and characterize the problem.

Treatment

Traditional Chinese medicine (TCM) has a particular understanding of baldness that is different from the allopathic view. TCM recommends foods to eat and others to avoid, herbs to treat hair loss, and special hair massage. One Chinese approach is to first understand where there is weak energy in the body and to strengthen the qi (chi) of those organ systems. Treatment is not a one-shot approach but a well-rounded response.

Vitamins B_6 and **biotin** are thought to advocate healthy hair growth, as are the minerals **zinc**, **copper**, and **silica**. Fifty milligrams of silica a day is thought to encourage hair growth in young men with alopecia. The herb **horsetail** (*Equisetum arvense*) contains silica, and can be taken as an infusion, or tea. Copper and zinc have been shown to inhibit growth of the enzyme that causes DHT production. **Iron** supplements may be useful in individuals whose hair loss is caused by **anemia** or an inadequate intake of dietary iron.

The herbal remedies **saw palmetto** (*Serenoa repens*) and pygeum (*Pygeum africanum*) may be prescribed by an herbalist, naturopath, or holistic health-care professional to stop or slow hair loss. Saw palmetto is thought to stop DHT production, and pygeum influences testosterone production. Both can be taken orally as a dietary supplement. The Chinese herb He Shou Wun (*Polygonum multiflorum*) can be taken orally or applied as a topical formula.

For hair loss caused by trichotillomania (hair pulling), **behavioral therapy** may be a useful treatment program. If the hair pulling or hair loss itself is triggered by stress, there are a number of stress reduction therapies that can promote **relaxation**, including **aromatherapy**, muscle relaxation exercises, **yoga**, **guided imagery**, and **biofeedback**.

Allopathic treatment

Successful treatment of underlying causes is most likely to restore hair growth, be it the completion of chemotherapy, effective cure of a scalp fungus, or control of a systemic disease. Drugs such as minoxidil (Rogaine) and finasteride (Propecia, Proscar) promote hair growth in a significant minority of patients, especially those with male pattern baldness and alopecia areata. When used continuously for long periods of time, minoxidil produces satisfactory results in about one-quarter of patients with androgenic alopecia and as many as half the patients with alopecia areata. Both drugs have so far proven to be quite safe when used for this purpose. Side effects of Rogaine include some dryness and irritation of the scalp. Reported side effects of Propecia include infrequent cases of diminished sexual drive and **impotence**. Propecia is not approved for women because it can cause birth defects.

In 2001, a study was made of immunotherapy with diphencyprone to treat alopecia areata. A lag of three months from start of therapy to development of noticeable hair growth occurred. Researchers noted that the extent of the disease prior to therapy and age at time hair loss began, affected treatment success. Patients who were older at onset of baldness had a better success rate than those who were younger. The study concluded that long-term therapy was required for effectiveness.

Over the past few decades, a multitude of hair replacement methods performed by both physicians and non-physicians have appeared. They range from simply weaving someone else's hair in with the remains of an individual's own hair to surgically transplanting thousands of hair follicles one at a time.

Expected results

The prognosis for individuals with hair loss varies with the cause. It is generally much easier to lose hair than to regrow it. Even when it returns, it is often thin and less attractive than the original crop.

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Paula Ford-Martin
Teresa Odle

Halitosis

Definition

Halitosis, commonly called bad breath, is an unpleasant odor of the breath. Usually it is due to poor hygiene, but it can be an indication of underlying health problems.

Description

Halitosis is likely to be experienced by most adults and many children, at least occasionally. Some people are strongly convinced that bad breath is present when it is not. Bad breath can have a significant impact on a person's social and professional life.

Causes and symptoms

Accumulation of plaque on the teeth is a major cause of halitosis. Plaque is a mucus film that mixes with food particles, saliva, and bacterial residue in the mouth. Halitosis can also be caused by any number of other problems. These include sores in the mouth, infected tonsils, tooth or **gum disease**, fermentation of food particles in the mouth, sinus **infections**, and badly cleaned dentures. Conditions that may cause bad breath are not only limited to the oral and nasal areas. Other possible sources of the problem might be **indigestion**, lung infection, kidney failure, **tuberculosis**, **syphilis**, liver disease, stomach and intestinal problems, **stress**, dehydration, **zinc** deficiency, and **cancer**.

Cigarette **smoking** can also lead to bad breath, not only in the smoker, but also in someone constantly exposed to second-hand smoke. A diet high in fats, spicy foods, or one that includes coffee may contribute to unpleasant breath odors. Medications causing **dry mouth** or dehydration may also be a source of problems, since the flow of saliva helps clean out the mouth. Antihistamines, decongestants, antidepressants, anti-anxiety medications, diuretics, and some heart medications may have a dehydrating effect and could be a cause of bad breath.

According to **traditional Chinese medicine**, halitosis is caused by too much heat in the stomach that affects the mouth. The way to prevent it is by avoiding dairy products, coffee, alcohol, sugar, spicy food, and fried food that disrupt normal acid and enzyme levels in the body. If these foods are eliminated from the diet and halitosis continues, traditional Chinese medicine recommends taking **activated charcoal** tablets.

Diagnosis

The easiest way to determine if one has bad breath is to ask a friend who is trustworthy and discrete or to ask a doctor or dentist. A test that can be attempted on one's own, is to cup a hand over the mouth, exhale, and then inhale through the nose while smelling the breath. A physical examination by a doctor or dentist may be used to diagnose other problems that may be causing the bad breath.

Treatment

Leaves of **parsley**, *Petroselinum crispum;* **wintergreen**, *Gaultheria procumbens;* or **peppermint**, *Mentha piperita;* can be chewed to freshen the breath by the introduction of their aromatic substances into the lungs. A strong tea made of *Echinacea* spp.; **myrrh**, *Commiphora molmol*; and **bloodroot**, *Sanguinaria canadensis*; can be used as a daily mouthwash. Fresh apples, citrus fruits, and celery are also good foods for helping to clean out the mouth. Possible homeopathic remedies that may be useful for bad breath include ***Nux vomica*** and *Kali phosphoricum.* Supplementing with zinc and **vitamin C** may also be of benefit.

Allopathic treatment

The most effective treatment of bad breath is to treat the cause. If bad breath is a continuing problem

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or there are other symptoms, such as bleeding gums, a doctor or dentist should be consulted. A medication change may be warranted if a prescription drug is contributing to bad breath. A physician should be consulted any time a change in medication is planned. Over-the-counter mouthwashes and rinses can be used to kill odor-causing bacteria in the mouth.

Expected results

Most bad breath can be treated successfully with good oral hygiene or medical care. Occasionally, a person may develop delusional or obsessive behavior regarding breath odor problems, and mental health counseling may be appropriate.

Prevention

A healthy diet, high in fresh fruits and vegetables and whole grains, should be eaten. Eating crunchy foods such as apples, carrots, or celery after meals can help scrape off plaque. Processed foods such as sugar and white bread and grains contribute to plaque formation and should be avoided. Spicy foods such as onions, peppers, **garlic**, pastrami, salami, pepperoni, anchovies, and others should be avoided. Plenty of water should be consumed throughout the day to avoid dehydration and dry mouth. Water should be consumed after taking any food or drink to wash away residues that may accumulate with plaque.

The teeth should be brushed and flossed daily after meals. Toothbrushes should be changed monthly, since there may be a tendency for bacteria to accumulate on them. Baking soda is a good choice for cleaning the teeth when bad breath is a problem. The baking soda makes the mouth pH less hospitable to odor-causing bacteria. Gentle brushing of the tongue should also be included in the routine of daily oral hygiene, since the tongue itself may harbor tiny particles of food. A device called a tongue blade can be useful for cleaning the tongue. It may be available from a store that sells Asian or Middle Eastern products. An oral irrigation device, such as a Water Pik, is recommended to more thoroughly remove food and debris from the teeth. Mouthwashes are often helpful, especially those containing zinc. A dentist should regularly check the health of the gums and teeth for disease. A dental hygienist should clean the teeth regularly, especially if there is an increased tendency to form plaque.

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Canadian Dental Association, 1815 Alta Vista Dr., Ottawa, ON, K1G 3Y6, Canada, (613) 523-1770, http:// www.cda-adc.ca.

Patience Paradox
Ken R. Wells

Hangnail *see* **Ingrown nail**

Hangover

Definition

Hangover is the collection of physical and mental symptoms that occur after a person drinks excessive amounts of alcohol. The ingestion of five to seven cocktails over a period of four to six hours usually will lead to hangover. The economic cost of hangover in the United States as of 2008 is $148 billion each year, or $2,000 per working adult, which is related to decreased productivity and absenteeism.

Description

Hangovers have probably been experienced since prehistoric time when alcohol was first discovered. A survey found that about 75% of the persons who drank enough to be intoxicated (drunk) sometimes experienced hangover. Although very prevalent, hangovers have not been extensively studied. It is known that ethanol is the primary chemical component of alcohol to produce the effects associated with drinking.

Whether hangover affects complex mental tasks and the performance of simple tasks is unclear. Studies

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on these areas have yielded conflicting results, presumably due to differences in methods. Clearly, alcohol consumption can affect sleep, and sleep deprivation is known to affect performance.

Causes and symptoms

The cause of hangover is believed to be multifactorial. Hangover is likely caused by a combination of direct effects of ethanol, effects of ethanol removal, effects of ethanol breakdown products, effects of other components of the alcoholic beverage, personal characteristics, and behaviors associated with alcohol use.

Direct effects of ethanol

Ethanol can directly affect the body by causing dehydration (loss of fluids), electrolyte (body chemicals) imbalance, stomach and intestinal irritation, low blood sugar, and sleep disruption. In addition, alcohol directly affects the circadian rhythm (internal 24-hour clock) causing a feeling similar to **jet lag**. Ethanol causes vasodilation (enlarged blood vessels) and affects bodily chemicals, such as serotonin and histamine, which may contribute to the **headache** associated with hangover.

Effects of ethanol removal

Because hangover symptoms peak at around the same time that the blood alcohol concentration falls to zero, some researchers propose that hangover is actually a mild form of withdrawal. Excessive drinking causes changes in the chemical messenger system of the brain, and when the alcohol is removed, the system becomes unbalanced. Many of the symptoms of hangover are similar to those associated with mild withdrawal. Some differences exist, however, between hangover and withdrawal; specifically, hangover symptoms do not include the hallucinations, seizures, and the lengthy impairment of withdrawal.

Effects of ethanol breakdown products

In the body, ethanol is first broken down to acetaldehyde and then to acetate. Acetaldehyde is a reactive chemical that, at high concentrations, can cause sweating, rapid pulse, skin flushing, **nausea**, and **vomiting**. Some researchers believe that acetaldehyde causes hangover. Although there is no acetaldehyde in the blood when the blood alcohol concentration reaches zero, the toxic effects of acetaldehyde on the body may still persist.

Other factors

Most alcoholic beverages contain small amounts of other active compounds besides ethanol. These compounds add to the smell, taste, and appearance of the beverage. Gin or vodka, which contain almost pure ethanol, produce fewer hangover symptoms than alcoholic beverages that contain other alcohol compounds (such as red wine, brandy, or whiskey). For example, methanol is implicated in contributing to hangover. Red wine, whiskey, and brandy all contain high levels of methanol.

Some inherent personal traits place persons at risk of experiencing hangover. In some persons, high levels of acetaldehyde accumulate (because of a deficient enzyme), which causes them to experience more severe hangovers. Persons who are neurotic, angry, or defensive, feel guilty about drinking, experience negative life events, or have a family history of **alcoholism** have increased hangover symptoms.

Certain behaviors associated with drinking increase the chance of experiencing hangover. These include drug use, disruption of normal sleep patterns, restricted food intake, and cigarette use.

Hangover symptoms begin within several hours after a person has stopped drinking and may last up to 24 hours. The specific symptoms experienced may vary depending upon the individual, the occasion, and the type and amount of alcohol consumed. The physical symptoms of hangover include headache, **fatigue**, light and sound sensitivity, muscle aches, eye redness, thirst, nausea, vomiting, and stomach **pain**. Hangover can cause rapid heartbeat, **tremor**, increased blood pressure, and sweating. Mental symptoms associated with hangover are decreased sleep, changes in sleep stages, decreased attention, decreased concentration, **depression**, **dizziness**, **anxiety**, irritability, and a sense that the room is spinning (vertigo).

British research at the University of Exeter and University of Plymouth found that complementary and traditional forms of relieving hangover are ineffective, and this research recommends avoiding alcohol or consuming it in moderation as the most effective strategy in avoiding hangover.

Treatment

Eating balanced meals, drinking extra water, and limiting total alcohol intake help to reduce or avoid hangover. There are also many alternative treatments to prevent or reduce hangover symptoms. Drinking additional alcohol to relieve hangover, although it reduces short-term symptoms, is not recommended.

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Some experts believe that drinking alcohol to relieve hangover is a sign of impending alcoholism. The primary measure for fighting hangover is to drink plenty of water while drinking alcoholic beverages, before going to bed, and the day after. Sweating from exertion, **exercise**, sauna, or massage may also help.

Food therapy

Hangover symptoms may be reduced by taking in lots of extra water and fluids and by eating foods that are high in **vitamin C** and the B vitamins, which are believed to speed the removal of alcohol from the body. Oranges, guava, grapefruit, and strawberries are rich in vitamin C, and beans, fish, and whole grains are rich in the B vitamins. A cocktail prepared from orange juice (1 cup), pineapple juice (1 cup), kiwi fruit (one), vitamin-B-enriched nutritional yeast (1 tablespoon), and honey (1 tablespoon) provides important nutrients which the body needs to recover from hangover. Juice therapists recommend drinking a mixture of carrot juice (8 oz), beet juice (1 oz), celery juice (4 oz), and **parsley** juice (1 oz) twice during hangover. The Chinese drink fresh tangerine juice and eat 10 strawberries to treat hangover.

Eating bland complex carbohydrates, such as crackers or toast, is easy on the stomach and helps to raise blood sugar levels. Because alcohol can irritate the gastrointestinal tract, bland foods are more easily tolerated. Drinking tea or coffee can relieve fatigue and possibly the headache. Throughout the world, traditional food remedies for hangover have certain ingredients in common. These include eggs, tripe, hot spices, hearty soups, and fruit and vegetable juices. These foods all serve to replenish vitamins, minerals, and other nutrients lost by the body as it detoxifies alcohol.

Ayurveda

Ayurvedic practitioners believe that hangover reflects the symptoms of excess pitta. Immediate relief may be found after drinking water containing lime juice (1 teaspoon), sugar (one half teaspoon), salt (pinch), and baking soda (one half teaspoon). Orange juice containing cumin (pinch) and lime juice (1 teaspoon) helps hangover. Drinking cool lassi, water containing yogurt (1 tablespoon) and cumin powder (pinch), three or four times daily may relieve nausea, headache, and drowsiness.

Herbals

The following herbal remedies are useful in treating hangover symptoms:

- An Ayurvedic remedy is to take one-half teaspoon of a mixture of *shatavari* (5 parts), *shanka bhasma* (one-eighth part), *kama dudha* (one-eighth part), and *jatamamsi* (3 parts) with water 2 to 3 times daily.
- An Ayurvedic antidote for alcohol toxicity is one-half teaspoon of *tikta* (or myrrh, aloe vera, or *sudharshan*) with warm water three times during the day.
- Barberry (*Barberis vulgaris*) tea reduces hangover symptoms.
- Dandelion (*Taraxacum officinale*) and burdock (*Arctium lappa*) tea (with gentian extract, powdered ginger, and honey) can ease the nausea.
- Evening primrose (*Oenothera biennis*) oil helps to replenish lost gamma-linoleic acid.
- Milk thistle (*Silybum marinum*) reduces alcohol toxicity on the liver.
- Nux vomica (*Strychnos nux vomica*) is a homeopathic antidote for alcohol over-consumption.
- Siberian ginseng (*Eleutherococcus senticosus*) helps the body adjust to the stress of alcohol toxicity.
- Wintergreen (*Gaultheria procumbens*) tea with hot pepper (*Capsicum*) sauce relieves the headache.

Other hangover remedies

Other remedies for hangover are as follows:

- Acupressure. Point LI 4 (between the thumb and index finger) relieves headache and stomach ailments and the B2 points (upper edge of the eye socket) relieves headache accompanied by light sensitivity.
- Aromatherapy. The nausea of hangover may be relieved by drinking an aromatic cocktail of water, lemon juice, and a drop of fennel essential oil before breakfast.
- Imagery. The hangover sufferer may visualize being on a ship in a stormy ocean. The ocean gradually becomes calm until the ship is gently bobbing in the water.
- Probiotics. The bacteria *Bifidobacterium bifidus* is able to remove alcohol breakdown products. To fight hangover, naturopaths recommend taking *B. bifidus* before going to bed and again the following day.
- Supplements. Taking 50 mg of vitamin B_3 before going to bed may relieve hangover.
- Hydrotherapy. Drinking a glass of water containing activated charcoal powder before going to bed may absorb alcohol in the stomach and reduce hangover symptoms.

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KEY TERMS

Acetaldehyde—An intermediate product in the breakdown pathway of ethanol; believed to cause hangover.

Dehydration—Loss of fluids from the body. Dehydration worsens some of the symptoms of alcohol.

Ethanol—The chemical that causes the effects and aftereffects of drinking alcoholic beverages.

Methanol—A liquid alcohol, used as a solvent or denaturant for ethanol.

Withdrawal—The physical and mental symptoms caused by removal of alcohol or other addictive substance from the body.

Allopathic treatment

Hangover symptoms may be relieved by taking antacids for nausea and stomach pain and aspirin or a nonsteroidal anti-inflammatory drugs (ibuprofen or naproxen) for headache and muscle pains. Acetaminophen (Tylenol) should be avoided while drinking or during hangover because alcohol enhances acetaminophen's toxic effects on the liver. **Caffeine**, usually taken as coffee, is historically used to treat hangover, although this has not been studied as of 2008.

Going for a walk may also relieve the symptoms.

Expected results

There is no cure for hangover. Left untreated, hangover will resolve within several hours. Treatments may reduce the severity of certain symptoms.

Prevention

Hangover may be prevented by limiting the intake of alcohol or drinking alcoholic beverages with a lesser incidence of causing hangover such as gin, vodka, or pure ethanol. Getting adequate sleep may reduce the fatigue associated with hangover. Drinking nonalcoholic beverages, both during and after drinking alcohol, may reduce dehydration and reduce hangover symptoms. Taking 120 mg of **milk thistle** before drinking can help the liver detoxify the alcohol.

Resources

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Belinda Rowland
Rhonda Cloos, R.N.

Hardening of the arteries *see* **Atherosclerosis**

Hashimoto's thyroiditis

Definition

Hashimoto's thyroiditis, also known as chronic lymphocytic thyroiditis or autoimmune thyroiditis, is an autoimmune disease characterized by thyroid gland failure due to chronic inflammation.

Description

Hashimoto's thyroiditis is the most common inflammatory thyroid disorder and is the leading cause of **hypothyroidism**, especially in iodine-sufficient regions of the world. An enlarged thyroid gland is characteristic of the disease. During the course of this disease, the cells of the thyroid are unable to convert **iodine** into thyroid hormones.

The term Hashimoto's thyroiditis can be attributed to the Japanese surgeon, Hashimoto Hakaru, who first described this chronic thyroid disorder as struma lymphomatosa in a 1912 pathology report.

Demographics

Hashimoto's thyroiditis is more common in women than in men with a ratio of approximately 7:1. It is most common in women aged 30 to 50. However, the condition can also occur in children.

Causes and symptoms

Causes

Hashimoto's thyroiditis is an autoimmune disease thought to be activated by certain antibodies that

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attack the thyroid gland and inhibit the production of thyroid hormones, disrupting the body's natural metabolic processes. However, the exact mechanism of the autoimmunity is unknown.

A low prevalence of Hashimoto's thyroiditis is associated with mild iodine deficiency, although excessive iodine intake is associated with a higher prevalence of the disease.

Medications such as interferon, lithium, and amiodarone increase the risk of the disease. In some cases, treatment for **hyperthyroidism**, including radioactive iodine or surgical resection, can result in hypothyroidism. Environmental radiation exposure also increases the risk.

The condition can develop after **pregnancy** or a viral illness, and it may be related to pituitary or hypothalamus gland dysfunction or to tumors on these glands or the thyroid itself. It is considered a genetic trait, with an increased incidence among first-degree relatives who have the condition.

Symptoms

Visible thyroid enlargement or nodular growths may be signs of Hashimoto's thyroiditis. Symptoms generally develop slowly over several years and include:

- fatigue
- intolerance to cold
- menstrual cycle changes, infertility
- unexplained weight gain
- dry, coarse skin and hair
- yellowish skin
- puffy face
- hoarse voice
- muscle aches or cramps
- joint stiffness
- constipation
- mental and memory impairment, decreased concentration
- depression

Pain is not usually a symptom of Hashimoto's thyroiditis, but some patients do experience prolonged pain and tenderness.

Diagnosis

The results of the patient's medical history are evaluated, and a physical examination, including palpation of the patient's neck to detect enlargement or nodular growths, are performed. The physician may also perform skin and eye exams to rule out other conditions or possible complications.

Because thyroid antibodies are elevated in patients with Hashimoto's thyroiditis, a blood test that measures antithyroid antibody levels can be performed to help identify the disease. Measurement of thyroid-stimulating hormone (TSH or thyrotrophin) in the blood also helps identify the disease, since the level of TSH rises dramatically when the there is an underproduction of the thyroid hormone.

Cardiac function tests and an ultrasound may also be performed. A thyroid biopsy (tissue removal for laboratory analysis) is only performed if a suspicious area or nodule is found upon examination.

Although most physicians can diagnose and treat Hashimoto's thyroiditis, consultation with a clinical endocrinologist is recommended for the following patients, according to the *American Association of Clinical Endocrinologists Medical Guidelines for Clinical Practice for the Evaluation and Treatment of Hyperthyroidism and Hypothyroidism*:

- patients under age 18
- patients unresponsive to therapy
- pregnant patients
- patients with known cardiovascular disease
- patients who have a goiter, nodule, or other structural thyroid changes
- patients with other endocrine diseases

Treatment

Complementary treatment

Natural extracts that contain thyroid-derived hormone from the glands of pigs are alternative treatments for Hashimoto's thyroiditis. One such product, Armour Thyroid, contains both levothyroxine (T4) and triiodothyronine (T3). However, physicians do not recommend natural thyroid hormone extracts for several reasons. According guidelines published by the American Association of Clinical Endocrinologists, the bioequivalence of levothyroxine preparations is based on total measurement of active thyroid hormones (T3 and T4) and not TSH blood levels, so the required therapeutic dosage cannot be accurately assessed. Additionally, the balance of hormones in biological products is not the same as in humans. As of 2008, there were no safety reviews, scientific evidence, or approved therapeutic uses of natural thyroid hormone extracts by the FDA. Lastly, product formulations may

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vary, depending on the manufacturer, which could alter TSH to uncertain levels.

Allopathic treatment

Synthetic hormone replacement therapy with oral levothyroxine (synthetic thyroxine, T4) is the standard treatment for Hashimoto's thyroiditis if a deficiency of TSH is confirmed in blood test results. Daily supplementation with levothyroxine can help correct symptoms of thyroid deficiency, reduce the size of the thyroid or goiter, and prevent further enlargement. Improvements in symptoms may not be noted until a few months after treatment because the thyroid hormone acts slowly in the body. The dosage is evaluated within six months after therapy initiation to determine if an adjustment is necessary. The patient's dosage continues to be adjusted until optimal effects are achieved. Blood tests may be performed periodically to monitor the patient's response to the medication.

Contraindications for levothyroxine therapy include prior **heart attack**, thyrotoxicosis, or an untreated adrenal condition. Diabetes medications may need to be adjusted at the onset of levothyroxine therapy. Some foods, including soy products, salt substitutes, and high-iron foods, and nutritional supplements (**calcium**, **iron**, **potassium**, or iodine) may interfere with the body's ability to absorb the synthetic hormone. A registered dietitian can provide specific dietary guidelines for patients taking levothyroxine. Amiodarone should not be taken with thyroxine, and patients should discuss all current medications, including vitamins and supplements, with their physician prior to starting levothyroxine treatment.

If patients develop a **fever**, rash, **jaundice**, or joint pain, they should promptly discontinue their medication and contact their physician, as these may be signs of an allergic reaction or a needed dose adjustment. To make dose adjustments, the physician reviews the results of lab tests to evaluate the patient's response to the medication. Patients should maintain a regular follow-up schedule with their physician for close monitoring.

Antiinflammatory medications, and occasionally steroid therapy, may be prescribed to manage symptoms of pain.

Surgical removal of the thyroid gland, called thyroidectomy, is uncommon but may be necessary in select cases.

KEY TERMS

Endocrinologist—A physician who specializes in the diagnosis and treatment of endocrine system conditions, including thyroid dysfunction.

Goiter—An enlargement of the thyroid gland that is often visible as a lump in the middle of the lower neck.

Hyperthyroidism—High thyroid activity marked by excessive levels of thyroid hormones.

Hypothyroidism—Low thyroid activity marked by low levels of thyroid hormones.

Iodine—A trace mineral used by the body to produce thyroid hormones.

Metabolism—Biochemical processes related to the breakdown of food and its conversion into energy.

Thyroid—A small gland, located in the middle of the lower neck. A properly functioning thyroid maintains a balance of thyroid hormones to sufficiently regulate the body's metabolism.

Thyroditis—Inflammation of the thyroid.

Thyrotoxicosis—High blood levels of the thyroid hormone levels, thyroxine (T4), triiodothyronine (T3), or both.

Prognosis

Hashimoto's thyroiditis is a chronic condition. However, with early diagnosis, proper treatment, and careful monitoring, symptoms can be managed and the patient can lead a normal, healthy life.

Potential complications of untreated Hashimoto's thyroiditis include an increased risk of **heart disease**, due to the increased levels of LDL **cholesterol** from an underactive thyroid, as well as an increased risk of **sleep apnea**. There is also an increased risk of birth defects in babies born to women with untreated hypothyroidism.

Prevention

There is no known prevention for Hashimoto's thyroiditis, although awareness of risk factors can aid early diagnosis and treatment to improve long-term outcomes.

A doctor should be notified if the following occurs:

- A fever, rash, jaundice, or joint pain
- Unfamiliar, unexplained symptoms

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ORGANIZATIONS

American Thyroid Foundation, 6066 Leesburg Pike, Suite 550, Falls Church, VA, 22041, (800) THYROID, (703) 998-8890, http://www.thyroid.org.

Thyroid Foundation of America, One Longfellow Place, Suite 1518, Boston, MA, 02114, (800) 832-8321, (617) 534-1500, http://www.allthyroid.org.

Angela M. Costello

Hatha yoga

Definition

Hatha **yoga** is the most widely practiced form of yoga in America. It is the branch of yoga that concentrates on physical health and mental well-being. Hatha yoga uses bodily postures (*asanas*), breathing techniques (*pranayama*), and **meditation** (*dyana*) with the goal of bringing about a sound, healthy body and a clear, peaceful mind. There are nearly 200 hatha yoga postures, with hundreds of variations, which work to make the spine supple and to promote circulation in all the organs, glands, and tissues. Hatha yoga postures also stretch and align the body, promoting balance and flexibility.

Origins

Yoga was developed in ancient India as far back as 5,000 years ago; sculptures detailing yoga positions have been found in India which date back to 3000 B.C. Yoga is derived from a Sanskrit word which means "union." The goal of classical yoga to bring self-transcendence, or enlightenment, through physical, mental and spiritual health. Many people in the West mistakenly believe yoga to be a religion, but its teachers point out that it is a system of living designed to promote health, peace of mind, and deeper awareness of ourselves. There are several branches of yoga, each of which is a different path and philosophy toward self-improvement. Some of these paths include service to others, pursuit of wisdom, non-violence, devotion to God, and observance of spiritual rituals. Hatha yoga is the path that has physical health and balance as a primary goal, for its practitioners believe that greater mental and spiritual awareness can be brought about with a healthy and pure body.

The origins of hatha yoga have been traced back to the eleventh century A.D. The Sanskrit word *ha* means "sun" and *tha* means "moon," and thus hatha, or literally sun-moon yoga, strives to balance opposing parts of the physical body, the front and back, left and right, top and bottom. Some yoga masters (*yogis*) claim that hatha yoga was originally developed by enlightened teachers to help people survive during the Age of Kali, or the spiritual dark ages, in which Hindus believe we are now living.

The original philosophers of yoga developed it as an eight-fold path to complete health. These eight steps include moral and ethical considerations (such as honesty, non-aggression, peacefulness, generosity, and sexual propriety), self-discipline (including purity, simplicity, devotion to God, and self-knowledge), posture, breath control, control of desires, concentration, meditation, and happiness. According to yogis, if these steps are followed diligently, a person can reach high levels of health and mental awareness.

As it has subsequently developed, hatha yoga has concentrated mainly on two of the eight paths, breathing and posture. Yogis believe breathing to be the most important metabolic function; we breathe roughly 23,000 times per day and use about 4,500 gallons of air, which increases during **exercise**. Thus, breathing is extremely important to health, and *prana*, or life-force, is found most abundantly in the air and in the breath. If we are breathing incorrectly, we are hampering our potential for optimal health. *Pranayama*, literally the "science of breathing" or "control of life force," is the yogic practice of breathing correctly and deeply.

In addition to breathing, hatha yoga utilizes asanas, or physical postures, to bring about flexibility, balance and strength in the body. Each of these postures has a definite form and precise steps for achieving the desired position and for exiting it. These postures, yogis maintain, have been scientifically developed to increase circulation and health in all parts of the body, from the muscular tissues to the glands and internal organs. Yogis claim that although hatha yoga can make the body as strong and fit as any exercise program, its

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KEY TERMS

Asana—Yoga posture or stance.

Diaphragm breathing—Method of deep breathing using the entire lungs.

Dyana—Yoga meditation.

Meditation—Technique of mental relaxation.

Prana—Yoga term for life-enhancing nutrient found in air, food and water.

Pranayama—Yoga method of breathing.

real benefits come about because it is a system of maintenance and balance for the whole body.

Yoga was brought to America in the late 1800s, when Swami Vivekananda, an Indian yogi, presented a lecture on yoga in Chicago. Hatha yoga captured the imagination of the Western mind, because accomplished yogis could demonstrate incredible levels of fitness, flexibility, and control over their bodies and metabolism. Yoga has flourished in the West. Americans have brought to yoga their energy and zest for innovation, which troubles some Indian yogis and encourages others, as new variations and schools of yoga have developed. For instance, power yoga is a recent Americanized version of yoga which takes hatha yoga principles and speeds them up into an extremely rigorous aerobic workout, and many strict hatha yoga teachers oppose this sort of change to their philosophy. Other variations of hatha yoga in America now include Iyengar, Ashtanga, Kripalu, Integral, Viniyoga, Hidden Language, and Bikram yoga, to name a few. Sivananda yoga was practiced by Lilias Folen, who was responsible for introducing many Americans to yoga through public television.

Iyengar yoga was developed by B.K.S. Iyengar, who is widely accepted as one of the great living yogis. Iyengar uses classical hatha yoga asanas and breathing techniques, but emphasizes great precision and strict form in the poses, and uses many variations on a few postures. Iyengar allows the use of props such as belts, ropes, chairs, and blocks to enable students to get into postures they otherwise couldn't. In this respect, Iyengar yoga is good for physical therapy because it assists in the manipulation of inflexible or injured areas.

Ashtanga yoga, made popular by yogi K. Patabhi Jois, also uses hatha yoga asanas, but places an emphasis on the sequences in which these postures are performed. Ashtanga routines often unfold like long dances with many positions done quickly one after the other. Ashtanga is thus a rigorous form of hatha yoga, and sometimes can resemble a difficult aerobic workout. Ashtanga teachers claim that this form of yoga uses body heat, sweating, and deep breathing to purify the body.

Kripalu yoga uses hatha yoga positions but emphasizes the mental and emotional components of each asana. Its teachers believe that tension and long-held emotional problems can be released from the body by a deep and meditative approach to the yoga positions. Integral yoga seeks to combine all the paths of yoga, and is generally more meditative than physical, emphasizing **spirituality** and awareness in everyday life. Viniyoga tries to adapt hatha yoga techniques to each individual body and medical problem. Hidden Language yoga was developed by Swami Sivananda Radha, a Western man influenced by Jungian psychology. It emphasizes the symbolic and psychological parts of yoga postures and techniques. Its students are encouraged to write journals and participate in group discussions as part of their practice. Bikram yoga has become very popular in the late 1990s, as its popular teacher, Bikram Choudury, began teaching in Beverly Hills and has been endorsed by many famous celebrities. Bikram yoga uses the repetition of 26 specific poses and two breathing techniques to stretch and tone the whole body.

Benefits

In a celebrated 1990 study, *Dr. Dean Ornish's Program for Reversing Heart Disease* (Random House), a cardiologist showed that yoga and meditation combined with a low-fat diet and group support could significantly reduce the blockage of coronary arteries. Other studies have shown yoga's benefit in reducing stress-related problems such as high blood pressure and **cholesterol**. Meditation has been adopted by medical schools and clinics as an effective **stress** management technique. Hatha yoga is also used by physical therapists to improve many injuries and disabilities, as the gentleness and adaptability of yoga make it an excellent rehabilitation program.

Yoga has been touted for its ability to reduce problems with such varying conditions as **asthma**, backaches, diabetes, **constipation**, **menopause**, **multiple sclerosis**, **varicose veins**, and **carpal tunnel syndrome**. A vegetarian diet is the dietary goal of yoga, and this change of lifestyle has been shown to significantly increase longevity and reduce **heart disease**.

Yoga as a daily exercise program can improve fitness, strength, and flexibility. People who practice yoga correctly every day report that it can promote

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high levels of overall health and energy. The mental component of yoga can clarify and discipline the mind, and yoga practitioners say its benefits can permeate all facets of a person's life and attitude, raising self-esteem and self-understanding. Once individuals learn the basics of yoga, certain poses can be used to help with particular needs, such as improving memory and concentration or reducing bloating and **gas** after meals.

Description

A hatha yoga routine consists of a series of physical postures and breathing techniques. Routines can take anywhere from 20 minutes to two hours, depending on the needs and ability of the practitioner. Yoga should always be adapted to one's state of health; that is, a shorter and easier routine should be used when a person is fatigued. Yoga is ideally practiced at the same time every day, to encourage the discipline of the practice. It can be done at any time of day; some prefer it in the morning as a wake-up routine, while others like to wind down and de-stress with yoga at the end of the day.

Yoga asanas consist of three basic movements: backward bends, forward bends, and twisting movements. These postures are always balanced; a back bend should be followed with a forward bend, and a leftward movement should be followed by one to the right. Diaphragm breathing is important during the poses, where the breath begins at the bottom of the lungs. The stomach should move outward with the inhalation and relax inward during exhalation. The breath should be through the nose at all times during hatha asanas. Typically, one inhales during backward bends and exhales during forward bending movements.

The mental component in yoga is as important as the physical movements. Yoga is not a competitive sport, but a means to self-awareness and self-improvement. An attitude of attention, care, and non-criticism is important; limitations should be acknowledged and calmly improved. Patience is important, and yoga stretches should be slow and worked up to gradually. The body should be worked with, and never against, and a person should never overexert. A yoga stretch should be done only so far as proper form and alignment of the whole body can be maintained. Some yoga stretches can be uncomfortable for beginners, and part of yoga is learning to distinguish between sensations that are beneficial and those that can signal potential injury. A good rule is that positions should be stopped when there is sharp **pain** in the joints, muscles, or tendons.

Preparations

All that is needed to perform hatha yoga is a flat floor and adequate space for stretching out. A well-ventilated space is preferable, for facilitating proper breathing technique. Yoga mats are available that provide non-slip surfaces for standing poses. Loose, comfortable clothing should be worn. Yoga should be done on an empty stomach; a general rule is to wait three hours after a meal.

Yoga is an exercise that can be done anywhere and requires no special equipment. Yoga uses only gravity and the body itself as resistance, so it is a low-impact activity excellent for those who don't do well with other types of exercise. The mental component of yoga can appeal to those who get bored easily with exercise. By the same token, yoga can be a good stress management tool for those who prefer movement to sitting meditation.

Precautions

As with any exercise program, people should check with their doctors before starting yoga practice for the first time. Those with medical conditions, injuries or spinal problems should find a yoga teacher familiar with their conditions before beginning yoga. Pregnant women, particularly after the third month of **pregnancy**, should only perform a few yoga positions with the supervision of an experienced teacher. Some yoga asanas can be very difficult, and potentially injurious, for beginners, so teachers should always be consulted as preparation for advanced yoga positions. Certain yoga positions should not be performed by those with fevers, or during **menstruation**.

Side effects

Those just beginning hatha yoga programs often report **fatigue** and soreness throughout the body, as yoga stretches and exercises muscles and tendons that are often long-neglected. Some yogic breathing and meditation techniques can be difficult for beginners and can cause **dizziness** or disorientation; these are best performed under the guidance of a teacher.

Training and certification

At this time, there are no generally accepted standards for yoga teacher certification in the United States, unlike in Europe and England, where yoga schools have been standardized. Some schools in the United States require teachers to study for many years, while some will grant beginning certificates in a much shorter time. When choosing teachers, students should search

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for qualities they may require, such as understanding, patience, knowledge of certain medical conditions, carefulness, and attention to individual details.

Yoga classes cost around 10 dollars per session. Many communities, schools, and health organizations offer discounted or free yoga classes as part of health awareness programs. Yoga can be reimbursed by insurance when it is part of physical therapy.

Resources

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Schaeffer, Rachel. "Sharpen Your Memory with Yoga: These Poses can Help you be Less Frazzled and Forgetful." *Natural Health* (August 2002):40–42.

ORGANIZATIONS

International Association of Yoga Therapists (IAYT), 4150 Tivoli Ave., Los Angeles, CA 90066.

Yoga International Magazine R.R. 1 Box 407, Honesdale, PA 18431. http://www.yimag.com.

Yoga Journal P.O. Box 469088, Escondido, CA 92046. http://www.yogajournal.com.

Douglas Dupler
Teresa G. Odle

Hawaiian massage *see* **Lomilomi**

Hawthorn

Description

Hawthorn is a dense, thorny shrub that grows 5–13 ft (1.5–4 m) high. It has white flowers that look like roses and is considered one of the most beautiful of all the shrubs that flower in the spring. A member of the rose family, it has been planted along hedges to deter trespassers since the Middle Ages. Hawthorn grows throughout the world in moist areas.

Hawthorn is the common name for *Crataegus oxyacantha* or other *Crataegus* species. There are more than 300 species throughout the world. Hawthorn's flowers, leaves, and fruit (berries) are used as medicine, although the flowers have an unpleasant smell and taste slightly bitter. The hawthorn fruit is sour.

Hawthorn leaves. *(Photo by Kelly Quin. Reproduced by permission.)*

Hawthorn is one of the oldest medicinal plants known in Europe, where it has been used since the Middle Ages for heart problems. The ancient Greeks and Native Americans also recognized hawthorn's heart-healthy properties.

Hawthorn also is called *Crataegus* extract, mayflower, maybush, and whitethorn. Common trade names for hawthorn include Cardiplant, Hawthorn Berry, Hawthorn Formula, Hawthorn Heart, Hawthorn Phytosome, and Hawthorn Power.

General use

Hawthorn most commonly is used to treat **heart disease** and to treat and prevent cardiovascular disorders. Herbalists consider hawthorn to be the world's best heart tonic. It increases blood flow to the heart by dilating the coronary arteries; lowers blood pressure and eases the heart's workload by dilating arteries in the arms and legs; and increases the force of the heart's contractions.

In Europe, scientific studies have shown that the hawthorn leaf expands the blood vessels and lets more oxygen-rich blood reach the heart muscles; increases the strength of the heartbeat and slightly increases its speed; and helps the heart by reducing resistance throughout the rest of the circulatory system. Hawthorn leaf is used for **angina** and weak heart.

In addition to praising its benefits for cardiovascular insufficiency, **edema**, and the breathing difficulties associated with circulatory problems, James A.

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Duke, writing in his book *Dr. Duke's Essential Herbs* (2000), suggests that dried hawthorn fruit and flowers may also be useful in treating **attention-deficit hyperactivity disorder** (ADHD).

Hawthorn is also a powerful antioxidant. There is strong evidence that **antioxidants** lower the risk of heart attacks, strokes, and deaths from heart diseases, but this has not been proven in studies. Antioxidants are believed to help the coronary arteries dilate and increase blood flow to the heart. They may prevent blockages from coming back after a surgical procedure called angioplasty.

Hawthorn is used, in conjunction with standard medical treatment, for heart failure classified as mild to moderate (stage II) by the New York Heart Association and to prevent angina. Mild to moderate heart failure includes patients with heart disease who do not have any limitations in their physical activities due to the heart disease. They are comfortable when resting and feel symptoms such as **fatigue**, palpitation, shortness of breath, or angina **pain** when performing ordinary physical activities.

Hawthorn has long been used in Europe to treat mild cases of heart failure. In Germany, the Federal Institute for Drugs and Medical Devices has approved the use of hawthorn leaf with flower extracts as a treatment for New York Heart Association functional stage II heart failure. The treatment also is listed in the German Pharmacopeia and approved in the German Commission E monographs.

A 2003 trial of more than 200 patients, consisting of 16 weeks of hawthorne treatment, demonstrated an increased **exercise** capacity and decreased signs and symptoms on heart failure. Hawthorn was slightly more effective at a higher dose (1,800 mg per day).

In two studies of heart attacks in animals, reported in 2004 in the *Journal of Pharmacy and Pharmacology*, hawthorn extract was demonstrated to significantly reduce heart injury and death.

In a 2005 study reported in *Phytomedicine* people diagnosed with orthostatic hypotension (OH) experienced significant improvement in the condition. The one-week study combined hawthorn berry extract and camphor. Patients taking the blend experienced normalized blood pressure and some relief from the rapid drop in blood pressure and the **dizziness** when standing typical in orthostatic hypotension.

The Hawthorne Extract Randomized Blinded Chronic Heart Failure (HERB CHF) trial reported at the 2004 meeting of the Heart Failure Society of America, involved 120 patients diagnosed with chronic mild to moderately severe heart failure. One group was treated with 450 mg of hawthorne extract (WS 1442, Schwabe Pharmaceuticals, Karlsruhe, Germany) twice daily in addition to receiving standard medical therapy for heart failure (ACE inhibitor, beta-blocker, digoxin, and a diuretic as needed). A control group received a placebo in addition to the standard medical therapy. After six months, investigators found no evidence that the hawthorn extract, in 450 mg dosages twice daily, brought functional improvement or relief of symptoms in patients with chronic mild to moderately severe heart failure who are also receiving standard heart failure therapy.

In another trial, known as the Survival and Prognosis Investigation of Crataegus Extract (SPICE) trial, researchers investigated the effects of hawthorn extract (WS 1442 with a 17% to 20% concentration of oligomeric procyanidins) on the mortality of patients with congestive heart failure. According to Steve Stiles, writing in 2007 in the on-line publication *Heart Wire*, "hawthorn failed to show any incremental benefit when given with standard drug therapy to patients with chronic systolic heart failure."

In addition to capsules, hawthorn may be taken in liquid form for **insomnia** and nervous conditions and is used as a gargle for sore throats. In folk medicine, hawthorn is used as a heart tonic and treatment, to regulate blood pressure, and as a sedative, but as of 2008 it had not been proven effective in clinical studies.

Preparations

Hawthorn is most commonly used in liquid or dry extracts or as capsules. It is collected and dried at room temperature. The dosage of hawthorn varies and the manufacturer's directions should always be followed. A typical dose of hawthorn might be 160 to 900 mg of extract given in two or three doses a day or 1 gram of crushed herb taken up to five times a day. Hawthorn is slow acting and should be taken for at least six weeks duration. It should be stored in a tightly sealed container and protected from the light.

Precautions

Hawthorn should only be used for diagnosed heart conditions. Women who are pregnant or breast feeding should take hawthorn only under the advice of a physician. Patients who are sensitive to other types of **Rosacea** plants should not take hawthorn.

Hawthorn leaf only is useful for angina when it is used over a long period of time. It can sometimes prevent angina, but it cannot treat an angina attack.

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KEY TERMS

Angina—A type of pain in the chest caused by a temporary inadequate blood supply to the heart. Angina usually occurs after excitement or exertion.

Angioplasty—Surgery to dilate the narrowed or blocked part of a blood vessel.

Arrhythmia—An abnormal rate or rhythm of the heartbeat.

Cardiac glycosides—Drugs that block the enzyme that regulates the electrical activity of the heart.

Cardiovascular—Related to the heart and lungs.

Dyspnea—Shortness of breath.

Palpitation—A feeling of irregular or rapid heartbeat.

Side effects

Hawthorn rarely has side effects. In high doses, hawthorn can cause a severe drop in blood pressure, arrhythmias, and sedation.

Interactions

Since hawthorn performs the same function as some nitrates, cardiac glycosides, central nervous system depressants, and medications for high blood pressure, lower doses of these medications might be needed. Individuals ought to consult a qualified practitioner for appropriate dosages.

Resources

PERIODICALS

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Hay fever

Definition

Hay **fever**, which is also called allergic **rhinitis**, is a common allergic condition. A main feature of the condition is an inflammation of the nasal passages, or rhinitis, caused by an allergic reaction to pollen. Hay fever usually occurs when airborne plant pollens are at their highest levels in the spring, summer, and early fall.

Symptoms of hay fever

Symptoms
Sneezing
Runny nose
Watery eyes
Postnasal drip
Sore throat and roof of mouth
Head congestion
Ear pressure
Sleep disturbances
Nasal discharge
Swollen, blue-colored skin under the eyes (allergic shiners)
Fatigue
Irritability

(Illustration by Corey Light. Cengage Learning, Gale)

Description

Hay fever is one of the most common chronic diseases in the United States. Experts estimate that about 35 million people in the United States are affected. Hay fever can develop at any age, but it shows up most often in childhood through the early 20s. The term "hay fever" is not quite accurate, since the pollen of hay grasses is only one of the many possible allergens involved, and there is no fever. Although an allergy to pollen does not appear to be inherited, the tendency to allergic sensitivity in general may run in families.

Causes and symptoms

Of all the causes of **allergies**, pollen is one of the most widespread. Trees, weeds, and grasses produce pollen in large amounts for seed production. These pollens are dispersed by the wind, and many never

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reach the intended targets. Instead, they are inhaled through the nose and throat of animals, including humans. Different plants release their pollen at different times of the year, so the timing of hay fever symptoms varies from person to person, depending on which plants provoke a response.

For people with hay fever, inhaled pollen grains are identified by the body as foreign invaders. This reaction is probably due to a dysfunction in the immune system. The mast cells of the immune system act as storage containers for highly reactive chemical granules, including histamine. Allergens trigger a release of these granules, and the mast cells spill their chemicals into neighboring blood vessels and nerve cells. Histamine dilates the blood vessels, causing fluids to escape into surrounding tissues. This change results in swelling, pooling of fluid in the tissues, and redness of the nose and eyes. Histamine also stimulates **pain** receptors and causes the itchiness and discomfort of the nose, eyes, and throat that are common hay fever symptoms.

Inflammation of the nose, or rhinitis, is the major symptom of hay fever. Inflammation causes **itching**, **sneezing**, runny nose, redness, and tenderness. Swelling of the sinuses can constrict the Eustachian tube that connects the inner ear to the throat, causing a feeling of congestion and popping in the ears. Mucus from the sinuses may run down the back of the throat, leading to throat irritation and redness. Seasonal **fatigue** and sinus headaches may also be indications of hay fever, as well as respiratory congestion and a decreased sense of smell. Severe allergies can lead to dark circles under the eyes, puffy eyelids, and creases under the eyes. Characteristically, children with hay fever may push their noses upward with the palm of their hand or twitch their noses to clear the congestion.

Virtually any type of tree or grass may cause hay fever, although plants with showy flowers usually produce sticky pollen that is much less likely to become airborne. Among North American plants, weeds are the most prolific producers of allergenic pollen. Ragweed is the major culprit, but other plant pollens that routinely affect hay fever sufferers include sagebrush, lamb's quarter, Russian thistle, and English **plantain**. Grasses include timothy grass, Kentucky bluegrass, Johnson grass, Bermuda grass, redtop grass, orchard grass, and sweet vernal grass. Trees that produce allergenic pollen include **oak**, ash, elm, hickory, pecan, box **elder**, and mountain cedar.

Diagnosis

The diagnosis of hay fever is usually simple. A thorough history of the illness is important in diagnosing allergies, including whether the symptoms vary according to time of day or the season, and possible exposures. When symptoms always appear during a particular season and disappear with the onset of cold weather, hay fever is almost certainly the culprit. For a more definitive diagnosis, a skin prick test is used, in which a diluted extract of the suspected allergen is injected superficially or scratched into the skin and the reaction is observed. Another test is a provocative challenge, which is performed by putting an extract of the suspected allergen onto the conjunctiva of the eye or in the nose or lungs. When such direct skin testing is not possible, various methods of testing the blood may be used. Other conditions causing rhinitis, such as infection, may have to be ruled out by a nasal smear, in which a sample of mucus is taken on a swab for examination.

Treatment

Alternative treatments for hay fever often focus on modulation of the body's immune response. They frequently focus on diet and lifestyle adjustments. A healthy diet high in fiber and whole foods, including generous amounts of vegetables, grains, nuts, and raw seeds should be maintained. Plenty of fluids should be consumed. Six to eight glasses of water daily are recommended, along with plenty of herbal teas. Raw vegetable juices are also beneficial, particularly carrot, celery, beet, cucumber, spinach, and **parsley**. Meat, dairy, and foods high in saturated fats may aggravate a hay fever condition and should be limited in the diet. It is also best to avoid dairy products, wheat, eggs, citrus fruits, chocolate, peanuts, shellfish, food colorings, and preservatives, especially sulfites. These foods all contain common food allergens that may worsen hay fever symptoms. **Caffeine**, alcohol, tobacco, and sugar should be avoided, as well.

Beneficial supplements for treating hay fever include vitamins A, E, and B complex. **Vitamin C**, especially the buffered type, is a natural antihistamine. In substantial amounts it can help stabilize the mucous membrane response to allergens. **Bioflavonoids** prevent the release of histamine and can be taken in combination with vitamin C. **Essential fatty acids**, contained in **evening primrose oil**, **fish oil**, or **flaxseed** oil, are also recommended as a daily supplement. **Glutathione** peroxidase is an enzyme that blocks a key inflammatory reaction in the hay fever cycle. It can play a key role in neutralizing the allergic reactions of hay fever. **Selenium** is a trace mineral that may help stop the inflammation due to allergens and reduce other allergy symptoms.

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For symptomatic relief, nettles (*Urtica dioica*) have been reported to have the ability to clear the sinuses and to greatly reduce other symptoms. Tincture of **licorice** (*Glycerrhiza glabra*) is also recommended. A good tincture combination for hay fever is comprised of equal parts of **black cohosh** (*Cimicifuga racemosa*), Chinese **skullcap** (*Scutellaria baicalensis*), **pleurisy** root, or butterflyweed (*Asclepias tuberosa*), **catnip** (*Nepeta cataria*), and **cayenne** pepper (*Capsicum frutescens*). In western herbal remedies other herbs found to be effective include **ginger** root (*Zingiber officinale*), **eyebright** (*Euphrasia officinalis*), **goldenseal** (*Hydrastis canadensis*), horseradish (*Amoracia rusticana*), and **mullein** (*Verbascum thapsus*). **Bee pollen** may also be effective in alleviating or eliminating hay fever symptoms. Bee pollen should be taken a few months before the hay fever season starts. It desensitizes the body and can dramatically reduce hay fever symptoms.

Acute attacks of hay fever often respond to homeopathic remedies. Possible hay fever remedies include **Allium cepa**, **Arsenicum album**, **euphrasia**, Ferrum phosphoricum, **gelsemium**, Natrum muriaticum, Nux vomica, sabadilla, and wyethia, depending on the associated symptoms. Since hay fever is often associated with deep-seated health problems, it is often best addressed with a constitutional remedy and the guidance of an experienced homeopathic practitioner.

Indoor allergens can cause increased sensitivity to outdoor allergens. Therefore, allergy testing for allergens other than pollen should be conducted, and those allergens should be removed from the diet or the environment to the greatest extent possible.

Allopathic treatment

The goal of most medical approaches to hay fever treatment is reduction of symptoms. Avoidance of the allergens is best, but this step is often not possible. When it is not possible, drug therapy is the major form of medical treatment used. Care should be taken, however, since a wide variety of antihistamines are available, and they all have potential side effects that affect function. These side effects may include drowsiness, heart problems, and harmful interactions with other medications and medical conditions. The extended use of topical decongestants can cause rebound congestion that is worse than the original problem.

Antihistamines block the action of histamine. They are most effective when used preventively, before symptoms appear. Over-the-counter antihistamines are often sufficient to provide relief for hay fever symptoms. People with severe or frequent symptoms, however, may need stronger prescription antihistamines. Azelastine, an antihistamine nasal spray, is effective and causes fewer side effects than oral antihistamines. When antihistamines do not relieve nasal symptoms, a nasal spray of cromolyn **sodium** is sometimes used. It works by preventing the release of histamine and similar chemicals.

Decongestants constrict blood vessels and counteract the effects of histamine. They may also be helpful in reducing symptoms such as nasal congestion. Nasal sprays are available that can be applied directly inside the nose. Oral decongestants are available as well. Phenylpropanolamine, phenylephrine, or pseudoephedrine are available in many preparations combined with antihistamines to increase the effectiveness of the drugs. Some components of nasal sprays traditionally used to combat the symptoms of hay fever are, however, no longer available as of 2008 without a prescription because of their potential use in the illegal manufacture of methamphetamine and related drugs. Decongestants are stimulants and may cause increased heart rate and blood pressure, headaches, and agitation.

Corticosteroids may be prescribed to reduce severe symptoms. An intranasal corticosteroid spray can be quite useful in reducing inflammation of the mucous membranes. Severe symptoms that do not respond to other treatment may require a course of oral corticosteroids, which are best started before allergy season begins. They are especially effective because they work more slowly and last longer than most other types of medication.

Late in 2001, researchers reported the first of many new drugs that may change treatment of hay fever and **asthma**: omalizumab. A monoclonal antibody, omalizumab works by blocking immunoglobulin E (IgE), an antibody produced in excess in people suffering from hay fever. The U.S. Food and Drug Administration approved the use of omalizumab for the treatment of mild to severe asthma and related disorders in June 2003.

Expected results

Some individuals are able to outgrow hay fever if their immune systems become less sensitive to the pollen that causes their problem. However, while hay fever may improve over time, it may also get worse or even lead to the development of new allergies. Hay fever treatment may sometimes cause uncomfortable and even dangerous side effects. However, most people can achieve acceptable hay fever relief with a combination of preventive strategies and treatment.

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KEY TERMS

Allergen—A substance that provokes an allergic response.

Anaphylaxis—A possibly life-threatening allergic reaction causing increased sensitivity to an allergen. It can result in a sharp drop in blood pressure and difficulty breathing.

Antigen—A foreign protein to which the body reacts by making antibodies.

Granules—Small packets of reactive chemicals stored within cells.

Histamine—A chemical released by mast cells that activates pain receptors and causes cells to become leaky.

Mast cells—A type of immune system cell that is found in the lining of the nasal passages and eyelids, displays a type of antibody called immunoglobulin type E (IgE) on its cell surface, and participates in the allergic response by releasing histamine from intracellular granules.

Pollen count—The amount of pollen in the air; often broadcast on the daily news during allergy season. It tends to be lower after a heavy rain that washes the pollen out of the air and higher on warm, dry, windy days.

Prevention

As of the late 2000s there was no known way to prevent development of hay fever, but subsequent attacks may be reduced or prevented. Immunotherapy, also known as desensitization or allergy shots, involves injections of very small but gradually increasing amounts of an allergen over several weeks or months, with periodic boosters. This procedure serves to acclimatize, or familiarize, the body to encountering the allergen without having a major allergic response. Individuals receiving allergy shots are monitored closely following each shot because of the small risk of anaphylaxis. Full benefits of the shots may take up to several years to achieve, and even then about one person in five does not receive any benefit from the immunotherapy.

Reducing exposure to pollen may reduce symptoms of hay fever. Most trees produce pollen in the spring, while most grasses and flowers produce pollen during the summer, and ragweed and other late-blooming plants produce pollen during late summer and early autumn. People with hay fever should be aware of their particular pollen season and remain indoors whenever possible during that time. A pollen count can be used as a general guide for when it is most advisable to stay indoors to avoid contact with the pollen. Unfortunately, moving to a region with consistently low pollen counts is rarely effective, since new allergies to the local flora often develop.

Further strategies to prevent or reduce hay fever attacks include the following:

- Remain indoors with windows closed during the morning hours, when pollen levels are highest.
- Keep car windows rolled up while traveling by car.
- Wear a surgical facemask while outside.
- Forests and fields of grasses should be avoided, especially at the height of the pollen season.
- Wash clothes and hair after being outside.
- Air conditioners or air filters should be used in the home, and their filters should be changed regularly.

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Patience Paradox
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He shou wu *see* **Fo ti**

Head lice *see* **Lice infestation**

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Headache

Description

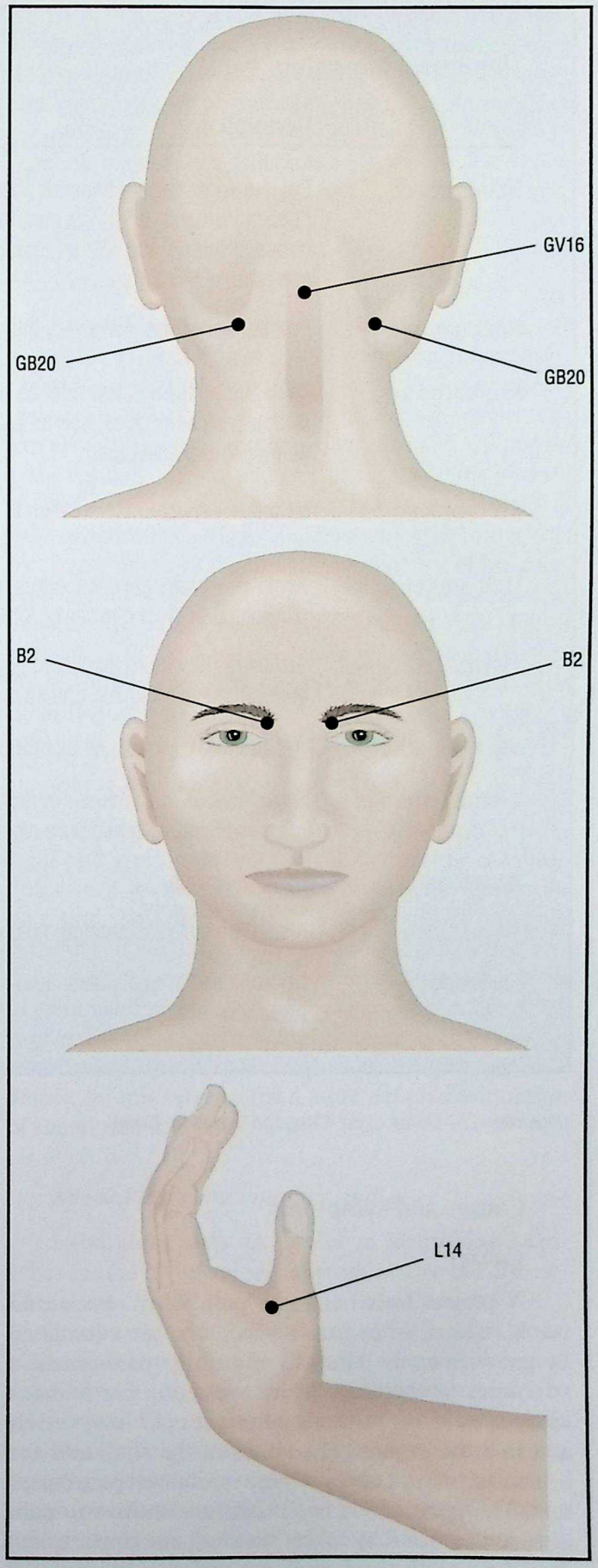
Headaches are divided into two large categories, primary and secondary, according to guidelines established by the International Headache Society (IHS). Primary headaches—accounting for more than 90% of all headaches— are not caused by an underlying medical condition. There are three major types of primary headaches: migraine, cluster, and tension. Secondary headaches are caused by another disease or medical condition and account for fewer than 10% of headaches.

Rebound headaches, also known as analgesic abuse headaches, are a subtype of primary headache caused by overuse of headache drugs. They may be associated with medications taken for tension or migraine headaches.

Secondary headaches are classified as either traction or inflammatory headaches. Traction headaches result from the pulling, pushing, or stretching of pain-sensitive structures, such as a brain tumor pressing upon the outer layer of tissue that covers the brain. Inflammatory headaches are caused by infectious diseases of the ears, teeth, sinuses, or other parts of the head.

Headaches are very common in the North American adult population. The American Council for Headache Education (ACHE) estimates that 95% of women and 90% of men in the United States and Canada have had at least one headache in the past 12 months. Most of these are tension headaches. Migraine headaches are less common, affecting about 11% of the population in the United States and 15% in Canada. Several studies indicate that doctors tend to underdiagnose migraine headaches; thus the true number of patients with migraines may be considerably higher than the reported statistics. Cluster headaches are the least common type of primary headaches, affecting about 0.4% of adult males in the United States and 0.08% of adult females. Cluster headaches occur most commonly in adults between the ages of 20 and 40. An estimated 45 million Americans suffer from chronic headaches each year. About 25% of adolescents aged 16–18 in the United States experience either severe or migraine headaches, according to the American Academy of Neurology. In the United States, 10 million doctor visits a year are for headaches.

It is possible for patients to suffer from more than one type of headache. For example, patients with chronic tension headaches often have migraine headaches as well.



Acupressure points that help relieve headaches. *(Illustration by GGS Information Services, Inc. Cengage Learning, Gale)*

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Headache therapies

	Description	Type
Acupressure	Press pointer fingers beneath cheekbones and parallel to pupils (Stomach 3) for one minute. Squeeze fleshy area between thumb and pointer finger (Large Intestine 4) for one minute.	Sinus
Acupuncture	Practitioners treat using very thin needles.	Tension
Aromatherapy	Message mixture of lavender oil and sunflower oil in temples, sides of eyes, behind ears, and on the neck. Do same using eucalyptus.	Migraine, tension, and sinus
Chiropractic	Spinal or cervical manipulation to realign posture.	Tension
Diet and exercise	Avoid chocolate, cheeses, citrus, red wine, and foods containing sodium nitrates or MSG. Exercise regularly	Migraine
Herbal remedies	Feverfew, hawthorn, skullcap, ginger, goldenseal, valerian, passionflower, and cayenne.	Migraine and tension
Homeopathy	Belladonna, bryonia, kali bichromicum, and nux vomica	Sinus and tension
Home remedies	Simultaneous ice pack/warm foot soak; drink three cold glasses of water; inhale pure oxygen.	Migraine and cluster
Massage	Scalp massage	All
Mind/body	Mediation and relaxation and biofeedback	Migraine
Osteopathy	Neuromuscular manipulatin and massage of head, neck, and shoulders.	All

(Illustration by Corey Light. Cengage Learning, Gale)

Causes and symptoms

Causes

A person feels headache **pain** when specialized nerve endings, known as nociceptors, are stimulated by pressure on or injury to any of the pain-sensitive structures of the head. Most nociceptors in humans are located in the skin or on the walls of blood vessels and internal organs. The bones of the skull and the brain itself do not contain these specialized pain receptors. The parts of the head that are sensitive to pain include the skin that covers the skull and upper spine; the fifth, ninth, and tenth cranial nerves, and the nerves that supply the upper part of the neck; and the large arteries located at the base of the brain, as well as those that supply the membranes covering the brain and spinal cord.

Tension headaches typically result from tightening of the face, neck, and scalp muscles as a result of emotional **stress**; physical postures that cause the head and neck muscles to tense (e.g., holding a phone against the ear with one's shoulder); emotional **depression** or **anxiety**; temporomandibular joint (TMJ) dysfunction; or arthritis of the neck. The tense muscles put pressure on the walls of the blood vessels that supply the neck and head, which stimulates the nociceptors in the tissues that line the blood vessels.

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The causes of migraine headaches have been debated since the 1940s. Some researchers think that migraines are the end result of a **magnesium** deficiency in the brain or of hypersensitivity to a neurotransmitter (brain chemical) known as dopamine. Another theory is that certain nerve cells in the brain become unusually excitable, setting off a chain reaction that leads to changes in the amount of blood flowing through the blood vessels and stimulation of their nociceptors. Specific genes associated with migraines have been discovered. This finding suggested that genetic mutations may be responsible for the abnormal excitability of the nerve cells in the brains of patients with migraine headaches.

Little is known about the causes of cluster headaches or changes in the central nervous system that produce them. Patients with cluster headaches are advised to quit **smoking** and minimize their use of alcohol because nicotine and alcohol appear to trigger these headaches. The precise connection between these chemicals and cluster attacks was as of 2008 not completely understood.

Symptoms

Tension headaches are less severe than other types of primary headache. They rarely last more than a few hours; 82% resolve in less than a day. Patients usually describe the pain of a tension headache as mild to moderate. Doctor do not find anything abnormal in the course of a general physical examination, although they may detect sore or tense areas (trigger points) in the muscles of the patient's forehead, neck, or upper shoulder area.

Migraine headaches are characterized by throbbing or pulsating pain of moderate or severe intensity lasting from four hours to as long as three days. The pain is typically felt on one side of the head; in fact, the English word "migraine" is a combination of two Greek words that mean "half" and "head." Migraine headaches worsen with physical activity and are often accompanied by **nausea** and **vomiting**. Patients with migraine headaches are hypersensitive to lights, sounds, and odors.

Cluster headaches are recurrent brief attacks of sudden and severe pain on one side of the head. The pain is usually most intense in the area around the eye. Cluster headaches may last between five minutes and three hours and may occur once every other day or as often as eight times per day. Some patients describe it as severe enough to make them consider suicide. Patients may pace the floor, weep, rock back and forth, or bang their heads against a wall in desperate attempts to stop the pain. In addition to severe pain, patients often have a runny or congested nose, watery or inflamed eyes, drooping eyelids, swelling in the area of the eyebrows, and heavy facial perspiration. Because of the nasal symptoms and the relative rarity of cluster headaches, they are sometimes misdiagnosed as sinusitis.

Diagnosis

Patient history

The differential diagnosis of headaches begins with a careful patient history that includes information about head injuries or surgery on the head; eye problems or disorders; sinus **infections**; dental problems or extensive oral surgery; and medications that the patient takes regularly. Some primary care physicians give the patient a printed questionnaire that consists of 50–55 brief questions covering such matters as the timing and frequency of the headaches, family history of the same type of headache, signs of depression, and correlation between headaches and weather changes. The doctor may also ask the patient to keep a headache diary to help identify foods, stress, lack of sleep, weather, and other factors that may trigger the pain.

Physical examination

A physical examination helps the doctor identify signs and symptoms that may be relevant to the diagnosis such as **fever**, difficulty breathing, nausea or vomiting, stiff neck, changes in vision or hearing, watering or inflammation of the nose and eyes, evidence of head trauma, skin **rashes** or other indications of an infectious disease, and abnormalities in the structure or alignment of the spinal column, teeth or jaw. In some cases, the doctor may refer the patient to a dentist or oral surgeon for a more detailed evaluation of the mouth and jaw.

Special tests and imaging studies

Laboratory tests are useful in identifying headaches caused by infections, **anemia**, or thyroid disease. These tests include a complete blood count (CBC), erythrocyte sedimentation rate (ESR), and blood serum chemistry profile. Patients who report visual disturbances and other neurologic symptoms may be given visual field tests and screened for **glaucoma** (a condition involving high fluid pressure inside the eye). Imaging studies may include x rays of the sinuses to check for infections, and CT or MRI scans, which can rule out brain tumors and cerebral aneurysms. Patients whose symptoms cannot be fully explained by the results of physical examinations and tests may

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be referred to a psychiatrist for evaluation of psychological factors related to their headaches.

Warning symptoms

There are warning signs associated with headache that indicate the need for prompt medical attention. Patients with any of the following symptoms should see a physician immediately:

- Three or more headaches per week
- Need for a headache pain reliever every day or almost every day
- Need for greater than recommended doses of over-the-counter (OTC) headache medications
- Headache accompanied by one-sided weakness, numbness, visual loss, speech difficulty, or other signs
- Headache that becomes worse over a period of six months, especially if most prominent in the morning or if accompanied by neurological symptoms
- Sudden onset of headache accompanied by fever and stiff neck
- Change in the character of the headaches—for example, persistent severe headaches in a person who has previously had only mild headaches of brief duration
- Recurrent headaches in a child
- Recurrent severe headaches beginning after age 50

Treatment

Alternative remedies can lessen the frequency and severity of headaches. Common treatments include:

- Acupressure. The stomach 3 and large intestine 4 points relieve sinus headaches.
- Acupuncture. A National Institutes of Health (NIH) panel concluded that acupuncture may be a useful treatment for headache.
- Aerobic exercise. Regular aerobic exercise reduces the frequency and intensity of headaches.
- Aromatherapy. Massage using the essential oils of lavender, rosemary, or peppermint relieves headache.
- Autogenic therapy. Headache may be relieved by learning to put oneself in a semi-hypnotic state.
- Biofeedback. Several types of biofeedback help relieve headaches, including electromyography (EMG) therapy, thermal hand-warming, and neurofeedback (EEG).
- Chiropractic. Cervical manipulation may relieve tension headaches.
- General exercise. Moderate exercise, such as a brisk daily walk for 20–30 minutes, can help fight migraines since it lowers stress, brings more oxygen to the body and brain, and relaxes tense muscles. Neck exercises are good for relieving tension headaches.
- Heat and/or cold. A hot shower or bath can ease tension headaches. Vascular headache may be relieved by placing an ice pack on the forehead or the feet in hot water and a cold pack on the forehead (hydrotherapy treatment).
- Herbals. Feverfew (*Chrysanthemum parthenium*) can be used for migraine; goldenseal (*Hydrastis canadensis*) for sinus headache; valerian (*Valeriana officinalis*), skullcap (*Scutellaria lateriflora*), or passionflower (*Passiflora incarnata*) for tension headache; and cayenne (in nostrils) for cluster headache. A German remedy made from butterbur root (*Petasites hybridus*) is available in the United States under the brand name Petadolex. The herb, Brahmi (*Bacopa monnieri*) is used in Ayurvedic medicine to treat headaches related to anxiety.
- Holistic medicine. Headaches may be caused by constipation and liver malfunction. Apple-spinach juice relieves constipation, and a blend of carrot, beet, celery, and parsley juices treats the liver.
- Homeopathy. Remedies are chosen for each patient and may include Belladonna (throbbing headache), Bryonia (splitting headache), Kali bichromicum (sinus headache), feverfew and butterbur (migraine headaches),and Nux vomica (tension headache with nausea and vomiting).
- Massage. Firm massage of the forehead, neck, and scalp may relieve headache. Tension headaches respond particularly well to massage.
- Osteopathy. Headache is treated with neuromuscular manipulation and massage of the head, neck, and upper back.
- Pressure. A headband tied tightly around the head may relieve migraines in some patients.
- Reflexology. Headache is treated using the solar plexus, ear, eye, and head points.
- Relaxation techniques. Meditation has been shown to help headache sufferers.
- Supplements. Vitamins B_2 and B_{12}, niacin, and magnesium (a mineral) may help treat or prevent headache.
- Transcutaneous electrical nerve stimulation (TENS). This effective headache treatment electrically stimulates nerves and blocks pain transmission.
- Visualization. This relaxation technique controls the images in the mind, replacing negative thoughts and images with positive ones that enhance relaxation.
- Yoga. Yoga is particularly good for tension headaches, since it quiets the nervous system and reduces stress.

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Allopathic treatment

Medical

Tension headaches are usually relieved fairly rapidly by such over-the-counter analgesics as aspirin (300–600 mg every four hours), acetaminophen (650 mg every four hours), or other nonsteroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen (brands include Advil or Motrin) or naproxen (brands such as Naprosyn or Aleve). For patients with chronic tension headaches, the doctor may prescribe a tricyclic antidepressant or benzodiazepine tranquilizer in addition to a pain reliever. One treatment for chronic tension headaches botulinum toxin (Botox type A) appears to work quite well for some patients.

Nonsteroidal anti-inflammatory drugs, including acetaminophen (e.g. Tylenol), ibuprofen, and naproxen are helpful for early or mild migraines. More severe attacks may be treated with dihydroergotamine, a group of drugs known as triptans, beta-blockers and **calcium** channel-blockers, antiseizure drugs, antidepressants (SSRIs), meperidine (Demerol), or metoclopramide (Reglan). Some of these medications are also available as nasal sprays, intramuscular injections, or rectal suppositories for patients with severe vomiting.

Sumatriptan (known as the brand Imitrex) or indomethacin (Indameth or Indocin) may be prescribed to suppress a cluster headache.

Surgical

Headaches that are caused by brain tumors, head trauma, dental problems, or disorders affecting the spinal discs usually require surgical treatment. In addition, some plastic surgeons have reported success in treating chronic migraine patients by removing some muscle tissue near the eyebrows, cutting a branch of the trigeminal nerve, and repositioning the soft tissue around the temples (sides of the head).

Psychotherapy

Psychotherapy may be helpful to patients with chronic headaches by interrupting the feedback loop between emotional upset and the physical symptoms of headaches.

Expected results

The prognosis for primary headaches varies. Episodic tension headaches usually resolve completely in less than a day without affecting the patient's overall health. The long-term outlook for patients with migraines depends on whether they have one or more of the other disorders associated with migraine. These disorders include Tourette's syndrome, **epilepsy**, ischemic **stroke**, hereditary essential **tremor**, depression, and anxiety. For example, migraine with aura increases a person's risk of ischemic stroke (when an artery to the brain is blocked) by a factor of six.

The prognosis for secondary headaches depends on the seriousness and severity of the cause.

KEY TERMS

Analgesics—A class of pain-relieving medicines, including aspirin and acetaminophen.

Biofeedback—A technique in which a person is taught to consciously control the body's response to a stimulus.

Cephalalgia—The medical term for headache.

Chronic—A condition that occurs frequently or continuously.

Neurotransmitter—Any of a group of chemicals that transmit nerve impulses across the gap (synapse) between two nerve cells.

Nociceptor—A specialized type of nerve cell that senses pain.

Primary headache—A headache that is not caused by another disease or medical condition.

Prophylactic—Treatment that prevents a disorder's symptoms from occurring.

Secondary headache—A headache that is caused by another disease or disorder.

Transcutaneous electrical nerve stimulation (TENS)—A treatment in which a mild electrical current is passed through electrodes on the skin to stimulate nerves and block pain signals.

Prevention

Lifestyle modification is one measure that people can take to lower their risk of tension headaches. They should get enough sleep and eat nutritious meals at regular times. Skipping meals, using unbalanced fad **diets** to lose weight, and insufficient or poor-quality sleep can bring on tension headaches.

Some headaches may be prevented by avoiding substances and situations that trigger them or by employing alternative therapies, such as **yoga** and regular **exercise**. Proper lighting may prevent headaches caused by eyestrain. Because food **allergies** are often linked with headaches, especially cluster strain headaches and migraines, identification and elimination of

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the allergy-causing food(s) from the diet can be an important preventive measure. Women with migraines often benefit by switching from oral contraceptives to another method of birth control or by discontinuing estrogen replacement therapy. Prophylactic treatments for migraine include prednisone, calcium channel blockers such as amlodipine (Norvasc), diltiazem (Cardizem), and nifedipine (Adalat, Procardia), and synthetic ergot alkaloids such as methysergide (Sansert).

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Tracey, Pepper. "Headache Help: Yoga Can Quiet Your Nervous System and Ease Pain in Your Head."*Natural Health* (October 2007): 63(3).

ORGANIZATIONS

American Headache Society, 19 Mantua Road, Mount Royal, NJ, 08061, (856) 423-0043, http://www.americanheadachesociety.org.

National Center for Complementary and Alternative Medicine, PO Box 7923, Gaithersburg, MD, 20898, (888) 644-6226, http://www.nccam.nih.gov.

National Headache Foundation, 820 N, Orleans, Suite 211, Chicago, IL, 60610, (888) 653-5552, http://www.headaches.org.

World Headache Alliance, 41 Wellbeck St., London, W1G 8EA, United Kingdom, http://www.w-h-a.org.

Rebecca Frey
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Hearing loss

Definition

Hearing loss is any degree of impairment of the ability to apprehend sound.

Description

Sound can be measured accurately. The term decibel (dB) is a measure of loudness and refers to a unit for expressing the relative intensity of sound on a scale from zero, for a nearly imperceptible sound, to 130, which is the level at which sound causes **pain** in the average person. A drop of more than 10 dB in the level of sound a person can hear is significant.

Sound travels as waves through a medium like air or water. These waves are collected by the external ear and cause the tympanic membrane (eardrum) to vibrate. The chain of ossicles (tiny bones) connected to the eardrum—the incus, malleus, and stapes—carries the vibration to the oval window (an opening to the inner ear), increasing its amplitude 20 times on the way. There, the energy causes a standing wave in the watery liquid (endolymph) inside the organ of Corti. (A standing wave is one that does not move.) The frequency of the sound determines the configuration of the standing wave. Many thousands of tiny nerve fibers detect the highs and lows of the standing wave and transmit their findings to the brain, which interprets the signals as sound.

To summarize, sound energy passes through the air of the external ear, the bones of the middle ear, and the liquid of the inner ear. It is then translated into nerve impulses, sent to the brain through nerves, and understood there as sound. It follows that there are five steps in the hearing process:

- air conduction through the external ear to the eardrum
- bone conduction through the middle ear to the inner ear
- water conduction to the organ of Corti
- nerve conduction into the brain
- interpretation by the brain

Hearing can be interrupted in a variety of ways at each of the five steps.

The external ear canal can be blocked with ear wax, foreign objects, infection, and tumors. Overgrowth of the bone can also narrow the passageway, making blockage and infection more likely. This condition can occur when the ear canal has been flushed with cold water repeatedly for years, as is the case with surfers, for whom the condition called "surfer's ear" is named.

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Decibel ratings and hazardous levels of noise

Decibel Level	Example of Sounds
30	Soft whisper, quiet library
35	Noise may prevent the listener from falling asleep
40	Quiet office noise level
50	Quiet conversation, moderate rainfall
60	Average television volume, sewing machine, lively conversation
70	Busy traffic, noisy restaurant, vacuum cleaner
80	Heavy city traffic, factory noise, alarm clock
90	Cocktail party, lawn mower, shop tools, subway
100	Pneumatic drill, snowmobile, chain saw
120	Sandblasting, thunder, amplified rock music
140	Jet airplane, firearms, air raid siren
180	Rocket launching pad

Above 110 decibels, hearing may become painful

Above 120 decibels is considered deafening

Above 135 decibels, hearing will become extremely painful and hearing loss may result if exposure is prolonged

Above 180 decibels, hearing loss is almost certain with any exposure

(Illustration by Corey Light. Cengage Learning, Gale)

The eardrum is so thin a physician can see through it into the middle ear. It can be ruptured by sharp objects, pressure from an infection in the middle ear, or even a firm cuffing or slapping of the ear. The eardrum is also susceptible to pressure changes during scuba diving.

Several conditions can diminish the mobility of the small bones (ossicles) in the middle ear. Otitis media, an infection in the middle ear, occurs when fluid cannot escape into the throat because the eustachian tube is blocked. The fluid (pus or mucus) that accumulates prevents the ossicles from moving as efficiently as they normally do, thus dampening the sound waves. In a disease called otosclerosis, spongy tissue grows around the bones of the inner ear. This growth sometimes binds the stapes in the oval window, which interferes with its normal vibration and causes deafness. All the conditions mentioned so far–those that occur in the external and middle ear–are causes of what is known as *conductive* hearing loss.

The second category, sensory hearing loss, refers to damage to the organ of Corti and the acoustic nerve. Prolonged exposure to loud noise is the leading cause of sensory hearing loss. A million people have this condition, many identified during the military draft and rejected as being unfit for duty. The cause is often believed to be prolonged exposure to loud music. Occupational noise exposure is the other leading cause of noise-induced hearing loss (NIHL) and is ample reason for wearing ear protection on the job.

More unusual, but often undetected, is low-frequency hearing loss. Scientists discovered in 2001

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KEY TERMS

Cochlea—A snail-shaped structure inside the inner ear, which contains the organ of Corti as well as fluid-filled compartments through which sound waves travel.

Decibel—A unit of the intensity of sound, a measure of loudness.

Meniere's disease—The combination of vertigo and decreased hearing caused by abnormalities in the inner ear.

Organ of Corti—A spiral structure inside the cochlea that converts vibration to signals that are passed to the brain.

Ossicles—A group of tiny bones in the middle ear that conduct sound through vibration. The bones are the malleus (or anvil), incus (or hammer), and stapes (or stirrup).

Otosclerosis—A disease that scars and limits the motion of the small conducting bones in the middle ear.

that people with a particular gene mutation gradually lose their abilities to hear low-frequency sounds. Since those people with this type of hearing loss can still distinguish speech, they often remain unaware of the low-frequency changes in their hearing. The scientists believe that the same gene mutations might make some people more susceptible to high-frequency hearing loss, but further study is needed.

One-third of people older than 65 have presbycusis, which is sensory hearing loss due to **aging**. Both NIHL and presbycusis are primarily loss of the ability to hear high-frequency sounds. In speech, consonants generally have a higher frequency than vowels. Yet in most languages, consonants provide us the clues needed for determining what a person is saying. So these people hear plenty of noise, they just cannot easily make out what it means. They have particular trouble differentiating speech from background noise.

Brain **infections** such as **meningitis**, drugs such as the aminoglycoside antibiotics (streptomycin, gentamycin, kanamycin, tobramycin), and Meniere's disease can also cause permanent sensory hearing loss. Meniere's disease combines attacks of hearing loss with attacks of vertigo. The symptoms may occur together or separately. High doses of salicylates such as aspirin and quinine can cause a temporary high-frequency loss, and prolonged high doses can lead to permanent deafness. There is also a hereditary form of sensory deafness and a congenital form most often caused by **rubella** (German **measles**).

Sudden hearing loss of at least 30 dB in less than three days is most commonly caused by cochleitis, a mysterious viral infection.

The final category of hearing loss is *neural* hearing loss. Permanent neural hearing loss most often results from damage to the acoustic nerve and the parts of the brain that control hearing. Strokes, **multiple sclerosis**, and acoustic neuromas are all possible causes of neural hearing loss.

Hearing can also be diminished by **tinnitus**, which is characterized by extra sounds generated by the ear. These sounds are referred to as tinnitus, and can be ringing, blowing, clicking, or anything else that no one but the patient hears. Tinnitus may be caused by loud noises, medication, **allergies**, or medical conditions—from the same kinds of disorders that can cause diminished hearing.

Diagnosis

Many common causes of hearing loss can be detected through an examination of the ears and nose combined with simple hearing tests performed in the physician's office. An audiogram (a test of hearing at a range of sound frequencies) often concludes the evaluation. These simple tests often produce a diagnosis. If the defect is in the brain or the acoustic nerve, further neurological testing and imaging will be required.

The audiogram has many uses in diagnosing hearing deficits. The pattern of hearing loss across the audible frequencies gives clues to the cause. Several alterations in the testing procedure can give additional information. For example, speech is perceived differently than pure tones. Adequate perception of sound combined with inability to recognize words points to a brain problem rather than a sensory or conductive deficit. Loudness perception is distorted by disease in certain areas but not in others. Acoustic neuromas often distort the perception of loudness.

Treatment

Conductive hearing loss can be treated with alternative therapies that are specific to the particular condition.

Nutritional therapy

The following dietary changes may help improve certain hearing impairment conditions:

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- Alleviate accumulated wax in the ear by taking oral supplements with essential fatty acids such as flax oil and omega-3 oil.
- Identify and avoid potential allergenic foods. Children who are allergic to foods have an increased risk of getting chronic ear infections.
- Take nutritional supplements. B-complex vitamins and iron supplements may be helpful in preventing protein deficiency and anemia. These conditions depress immune function and increase the risk of chronic ear infections. Children suffering from frequent ear infections may need supplementation with strong antioxidants such as vitamins A and C, zinc, and bioflavonoids. High-potency multivitamin and mineral supplements should contain most of these helpful nutrients as well as other essential vitamins and minerals.

Herbal therapy

There are several effective herbal treatments for hearing impairments. They include:

- Ginkgo biloba. Ginkgo may be effective in patients with hearing loss who often complain of ringing in the ears.
- Natural antibiotics such as echinacea and goldenseal can help prevent or treat ear infections.
- Certain Chinese herbal combinations can help alleviate tinnitus, ear infections, and chronic sinus infections that can lead to hearing loss.

Homeopathy

Homeopathic therapies may help patients who have sensory hearing loss. An experienced homeopathic physician will prescribe specific remedies based on knowledge of the underlying cause.

Acupuncture

Acupuncture may be able to improve hearing in some patients with sensory-neural deafness. It may be used to improve the circulation of fluids in the head that lead to chronic congestion and noises.

Other therapies

Other therapies that may help improve hearing in some patients include **Ayurvedic medicine**, **craniosacral therapy**, and **auditory integration training**.

Allopathic treatment

Conductive hearing loss can almost always be restored to some degree, if not completely.

- Matter in the ear canal can easily be removed, with a dramatic improvement in hearing.
- Surfer's ear gradually regresses if the patient avoids cold water or uses a special ear plug. In advanced cases, surgeons can grind away the excess bone.
- A middle-ear infection involving fluid is also simple to treat. If medications do not work, fluid may be surgically drained through the eardrum, which heals completely after treatment.
- Traumatically damaged eardrums can be repaired with a tiny skin graft.
- Otosclerosis may be surgically repaired through an operating microscope. In this intricate procedure, tiny artificial parts are substituted for the original ossicles.

Now available for complete conductive hearing loss are bone conduction hearing aids and even devices that can be surgically implanted in the cochlea.

Sensory and neural hearing loss, on the other hand, cannot readily be cured. Fortunately such hearing loss is rarely complete, and hearing aids can fill the deficit. In-the-ear hearing aids can boost the volume of sound by up to 70 dB. (Normal speech is about 60 dB.) Federal law now requires that aids be dispensed only by prescription.

Tinnitus can sometimes be relieved by adding white noise (such as the sound of wind or waves crashing on the shore) to the environment.

Decreased hearing is such a common problem that there are legions of organizations to provide assistance. Special language training, both in lip reading and signing, is available in most regions of the United States, as well as special schools and camps for children.

Prevention

Prompt treatment and attentive follow-up of middle-ear infections in children will prevent this cause of conductive hearing loss. Sensory hearing loss as a complication of epidemic disease has been greatly reduced by control of infectious childhood diseases, such as measles. Laws that require protection from loud noise in the workplace have substantially reduced incidences of noise-induced hearing loss. Surfers, cold-water fishermen, and other people who are regularly exposed to frigid water should use the right kind of ear plugs.

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ORGANIZATIONS

Alexander Graham Bell Association for the Deaf, 3417 Volta Place NW, Washington, DC 20007-2778, (202) 337-5220, http://www.agbell.org.

National Association of the Deaf, 814 Thayer Ave., Silver Spring, MD 20910-4500, (301) 587-1788. http://www.nad.org.

National Institute on Deafness and Other Communication Disorders, National Institutes of Health, 31 Center Dr., Bethesda, MD 20892, (301) 496-7243. Fax: (301) 402-0018, http://www.nih.gov/nidcd.

Self Help for Hard of Hearing People, Inc. 7910 Woodmont Avenue, Suite 1200, Bethesda, MD 20814, (301) 657-2248, http://www.shhh.org.

OTHER

DeafSource: An Internet Guide to Resources for Helping Professionals Working with Deaf and Hard of Hearing Individuals. http://home.earthlink.net/~drblood.

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Heart attack

Definition

A heart attack is the death of, or damage to, part of the heart muscle because its blood supply is severely reduced or stopped.

Description

Heart attack is the leading cause of death in the United States. Approximately every 29 seconds one American will have a heart attack, and once a minute one American will die from a heart attack. More than 1.5 million Americans suffer a heart attack every year, and almost half a million die, according to the American Heart Association. Most heart attacks are the end result of years of silent but progressive coronary artery disease, which can be prevented in many people. A heart attack is often the first symptom of coronary artery disease. According to the American Heart Association, 63% of women and 48% of men who died suddenly of coronary artery disease had no previous symptoms. Heart attacks are also called myocardial infarctions (MIs).

A heart attack occurs when one or more of the coronary arteries that supply blood to the heart are completely blocked and blood to the heart muscle is cut off. The blockage is usually caused by **atherosclerosis**, the build-up of plaque in the artery walls, and/or by a blood clot in a coronary artery. Sometimes, a healthy or atherosclerotic coronary artery has a spasm and the blood flow to part of the heart decreases or stops. Why this happens is unclear, but it can result in a heart attack.

About half of all heart attack victims wait at least two hours before seeking help. This increases their chance of sudden death or being disabled. The longer the artery remains blocked during a heart attack, the more damage will be done to the heart. That is why it is important to recognize the signs of a heart attack and seek prompt medical attention at the nearest hospital with 24-hour emergency cardiac care.

About one fifth of all heart attacks are silent, that is, the victim does not know one has occurred. Although the victim feels no **pain**, silent heart attacks can still damage the heart.

The outcome of a heart attack also depends on where the blockage is, whether the heart rhythm is disturbed, and whether another coronary artery supplies blood to that part of the heart. Blockages in the left coronary artery are usually more serious than in the right coronary artery. Blockages that cause an arrhythmia, an irregular heartbeat, can cause sudden death.

Causes and symptoms

Heart attacks are generally caused by severe coronary artery disease. Most heart attacks are caused by **blood clots** that form on atherosclerotic plaque. This blocks a coronary artery from supplying oxygen-rich blood to part of the heart. A number of factors increase the risk of developing coronary artery disease.

Major risk factors significantly increase the risk of coronary artery disease. Those that cannot be changed are:

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KEY TERMS

Angina—Chest pain that happens when diseased blood vessels restrict the flow of blood to the heart. Angina is often the first symptom of coronary artery disease.

Atherosclerosis—A process in which the walls of the coronary arteries thicken due to the accumulation of plaque in the blood vessels. Atherosclerosis is the cause of coronary artery disease.

Coronary arteries—The two arteries that provide blood to the heart. The coronary arteries surround the heart like a crown, coming out of the aorta, arching down over the top of the heart, and dividing into two branches. These are the arteries where coronary artery disease occurs.

Myocardial infarction—The technical term for heart attack. Myocardial means heart muscle and infarction means death of tissue from lack of oxygen.

Plaque—A deposit of fatty and other substances that accumulate in the lining of the artery wall.

- Heredity. People whose parents have coronary artery disease are more likely to develop it as well. African Americans are also at increased risk, due to their higher rate of severe hypertension than whites.
- Gender. Men under the age of 60 years of age are more likely to have heart attacks than women of the same age.
- Age. Men over the age of 45 and women over the age of 55 are considered at risk. Older people (those over 65) are more likely to die of a heart attack. Older women are twice as likely to die within a few weeks of a heart attack than men. This may be because of other co-existing medical problems.

Major risk factors that can be changed are:

- Smoking. Smoking greatly increases both the chance of developing coronary artery disease and the chance of dying from it. Smokers have two to four times the risk of non-smokers of sudden cardiac death and are more than twice as likely to have a heart attack. They are also more likely to die within an hour of a heart attack.
- High cholesterol. Cholesterol is a soft, waxy substance that is produced by the body, as well as obtained from eating foods such as meat, eggs, and other animal products. Cholesterol level is affected by age, sex, heredity, and diet. Risk of developing coronary artery disease increases as blood cholesterol levels increase. Total cholesterol of 240 mg/dL and over poses a high risk, and 200–239 mg/dL a borderline high risk. In LDL cholesterol, high risk starts at 130–159 mg/dL, depending on other risk factors. HDL (healthy cholesterol) can also lower or raise the coronary risk.
- High blood pressure. High blood pressure makes the heart work harder, and over time, weakens it. It increases the risk of heart attack, stroke, kidney failure, and congestive heart failure. A blood pressure of 140 over 90 or above is considered high. As the numbers increase, high blood pressure goes from Stage 1 (mild) to Stage 4 (very severe). When combined with obesity, smoking, high cholesterol, or diabetes, the risk of heart attack or stroke increases several times.
- Lack of physical activity. This increases the risk of coronary artery disease. Even modest physical activity is beneficial if done regularly.
- Use of certain drugs or supplements. Extreme caution is advised in the use of the herbal supplement ephedra. The supplement, which was marketed for weight loss and to improve athletic performance, was found to contribute to heart attack, seizure, stoke and death. In April 2003, the U.S. Food and Drug Administration (FDA) investigated controlling or banning the substance. While it was once believed that hormone replacement therapy (HRT) helped prevent heart disease in women, a large clinical trial called the Women's Health Initiative found the opposite to be true. In 2003, the FDA began requiring manufacturers of HRT to place warnings on the box listing adverse effects of estrogen, including increased risk of heart attack, stroke and blood clots. The labels also must mention that HRT should not be used as a preventive medicine for heart disease.

Contributing risk factors

Contributing risk factors have been linked to coronary artery disease, but their significance and prevalence are not known yet. Contributing risk factors are:

- Diabetes mellitus. The risk of developing coronary artery disease is seriously increased for diabetics. More than 80% of diabetics die of some type of heart or blood vessel disease.
- Obesity. Excess weight increases the strain on the heart, increases blood pressure and blood cholesterol, and increases the risk of developing coronary artery disease, even if no other risk factors are present. In fact, research in 2002 shows that losing weight also reduces inflammation of the arteries in obese women, which is a risk factor equal to that of high cholesterol.

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- Stress and anger. Some scientists believe that stress and anger can contribute to the development of coronary artery disease. Stress increases the heart rate and blood pressure, and can injure the lining of the arteries.

More than 60% of heart attack victims experience symptoms before the heart attack occurs. These sometimes occur days or weeks before the heart attack. Sometimes, people do not recognize the symptoms of a heart attack or are in denial that they are having one. Symptoms are:

- Uncomfortable pressure, fullness, squeezing, or pain in the center of the chest. This lasts more than a few minutes, or may go away and return.
- Pain that spreads to the shoulders, neck, or arms.
- Chest discomfort accompanied by lightheadedness, fainting, sweating, nausea, or shortness of breath.

All of these symptoms do not occur with every heart attack. Sometimes, symptoms disappear and then reappear. A person with any of these symptoms should immediately call an emergency rescue service or be driven to the nearest hospital emergency room.

Diagnosis

Experienced emergency care personnel can usually diagnose a heart attack simply by looking at the patient. To confirm this diagnosis, they talk with the patient, check heart rate and blood pressure, perform an electrocardiogram, and take a blood sample. The electrocardiogram shows which coronary artery is blocked. Electrodes covered with conductive jelly are placed on the patient's chest, arms, and legs. They send impulses of the heart's activity through an oscilloscope (a monitor) to a recorder, which traces them on paper. The blood test shows the leak of enzymes or other biochemical markers from damaged cells in the heart muscle. In 2003, the FDA cleared a new test for ruling out heart attacks in people who come to emergency rooms with severe chest pains. It is the first new blood test for evaluation of heart attacks since 1994 and is used along with an electrocardiogram.

Treatment

Heart attacks are treated with cardiopulmonary resuscitation (CPR) when necessary to start and keep the patient breathing and his heart beating. Upon arrival at the hospital, the patient is closely monitored. An electrical-shock device called a defibrillator may be used to restore a normal rhythm if the heartbeat is fluttering uncontrollably. Oxygen is often used to ease the heart's workload or to help a victim of a severe heart attack breathe easier. If oxygen is used within hours of the heart attack, it may help limit damage to the heart.

Alternative therapies aim at preventing the progression of **heart disease** that leads to a heart attack. Changes in lifestyle can also prevent second heart attacks.

Herbal medicine offers a variety of remedies that may have a beneficial effect on coronary artery disease. Oats (*Avena sativa*), **garlic** (*Allium sativum*), and guggul(*Commiphora mukul*) may help reduce **cholesterol**; linden (*Tilia europaea*) and **hawthorn** (*Crataegus spp.*) are sometimes recommended to control high blood pressure, a risk factor for heart disease. Tea (*Camellia sinensis*), especially **green tea**, is high in **antioxidants**, which studies have shown may have a preventative effect against atherosclerosis. A 2003 study found that black tea may reduce the risk of a heart attack by as much as 43% and that black tea's protective effects are even greater in women than in men.

Nutritional therapies have been shown to prevent coronary artery disease and stop, or even reverse, the progression of atherosclerosis. A low-fat, **high-fiber diet** is often recommended. It is essential to reduce the amount of meat and animal products consumed, as they are high in saturated fats. Whole grains, fresh fruits and vegetables, legumes, and nuts are recommended. Vitamin and mineral supplements that reduce, reverse, or protect against coronary artery disease include **chromium**; **calcium** and **magnesium**; B complex vitamins; the antioxidant vitamins B and E; L-carnitine; and **zinc**. These protective effects even work in the elderly, according to a 2003 report. A study revealed that those age 65 and older who ate the most cereal and bread fiber were 21% less likely to develop heart disease than those who ate the least. They also were less likely to have a heart attack or **stroke**.

Yoga and other bodywork, massage, **relaxation** therapies, **aromatherapy**, and **music therapy** may also help by reducing **stress** and promoting physical and mental well-being. A 1996 study in the United Kingdom found that participants who practiced **t'ai chi** had a resulting lowering in blood pressure. By evoking the body's relaxation response through **meditation** and deep breathing, blood pressure, metabolic rate, and hearth rate can all be reduced.

Allopathic treatment

Additional treatment after a heart attack can include close monitoring, electric shock, drug therapy, revascularization procedures, percutaneous transluminal coronary angioplasty and coronary artery bypass surgery.

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Drugs to stabilize the patient and limit damage to the heart include thrombolytics, aspirin, anticoagulants, painkillers and tranquilizers, beta-blockers, ace-inhibitors, nitrates, rhythm-stabilizing drugs, and diuretics. Thrombolytic drugs that break up blood clots and enable oxygen-rich blood to flow through the blocked artery increase the patient's chance of survival if given as soon as possible after the heart attack. These include anisoylated plasminogen streptokinase activator complex (APSAC) or anistreplase (Eminase), recombinant tissue-type plasminogen activator (r-tPA, Retevase, or Activase), and streptokinase (Streptase, Kabikinase).

To prevent additional heart attacks, aspirin and an anticoagulant drug often follow the thrombolytic drug. These prevent new blood clots from forming and existing blood clots from growing. Anticoagulant drugs help prevent the blood from clotting. The most common anticoagulants are heparin and warfarin. Heparin is given intravenously while the patient is in the hospital; warfarin, taken orally, is often given later. Aspirin helps to prevent the dissolved blood clots from reforming.

To relieve pain, a nitroglycerine tablet taken under the tongue may be given. If the pain continues, morphine sulfate may be prescribed. Tranquilizers such as diazepam (Valium) and alprazolam (Ativan) may be prescribed to lessen the trauma of a heart attack.

Percutaneous transluminal coronary angioplasty and coronary artery bypass surgery are invasive revascularization procedures which open blocked coronary arteries and improve blood flow. They are usually performed only on patients for whom clot-dissolving drugs do not work, or who have poor **exercise** stress tests, poor left ventricular function, or **ischemia**. Generally, angioplasty is performed before coronary artery bypass surgery.

Percutaneous transluminal coronary angioplasty, usually called coronary angioplasty, is a non-surgical procedure in which a catheter (a tiny plastic tube) tipped with a balloon is threaded from a blood vessel in the thigh or arm into the blocked artery. The balloon is inflated and compresses the plaque to enlarge the blood vessel and open the blocked artery. The balloon is then deflated and the catheter is removed. Coronary angioplasty is successful about 90% of the time. For one third of patients, the artery narrows again within six months after the procedure. The procedure can be repeated. It is less invasive and less expensive than coronary artery bypass surgery.

In coronary artery bypass surgery, called bypass surgery, a detour is built around the coronary artery blockage with a healthy leg or chest wall artery or vein. The healthy vein then supplies oxygen-rich blood to the heart. Bypass surgery is major surgery appropriate for patients with blockages in two or three major coronary arteries or severely narrowed left main coronary arteries, as well as those who have not responded to other treatments. About 70% of patients who have bypass surgery experience full relief from **angina**; about 20% experience partial relief. Long term, symptoms recur in only about three or four percent of patients per year. Five years after bypass surgery, survival expectancy is 90%, at 10 years it is about 80%, at 15 years it is about 55%, and at 20 years it is about 40%.

Expected results

The aftermath of a heart attack is often severe. Two-thirds of heart attack patients never recover fully. Within one year, 27% of men and 44% of women die. Within six years, 23% of men and 31% of women have another heart attack, 13% of men and 6% of women experience sudden death, and about 20% have heart failure. People who survive a heart attack have a chance of sudden death that is four to six times greater than others and a chance of illness and death that is two to nine times greater. Older women are more likely than men to die within a few weeks of a heart attack.

Statistics released in early 2002 revealed that about half of all deaths from heart disease happen before the patient can get to the hospital. Women were slightly more likely than men to die quickly after cardiac arrest and the risk of dying quickly from heart disease increased with age, to 61% of those over age 85. The study authors said that improved prevention and recognition of the warning symptoms of heart attack could lower the number of sudden deaths.

Prevention

Many heart attacks can be prevented through a healthy lifestyle, which can reduce the risk of developing coronary artery disease. For patients who have already had a heart attack, a healthy lifestyle and carefully following doctor's orders can prevent another heart attack. A heart healthy lifestyle includes eating right, regular exercise, maintaining a healthy weight, no **smoking**, moderate drinking, no illegal drugs, controlling **hypertension**, and managing stress.

A healthy diet includes a variety of foods that are low in fat (especially saturated fat), low in cholesterol, and high in fiber; plenty of fruits and vegetables; and

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limited **sodium**. Saturated fat raises cholesterol, and, in excessive amounts, it increases the amount of the proteins in blood that form blood clots. Polyunsaturated and monounsaturated fats are relatively good for the heart. Fat should comprise no more than 30 percent of total daily calories. Evidence suggests that a diet rich in **lutein**, the pigment found in dark green leafy vegetables, helps artery walls fight plaque and lessens risk of heart attack.

Cholesterol should be limited to about 300 mg per day. Many popular lipid-lowering drugs can reduce LDL-cholesterol by an average of 25–30% when combined with a low-fat, low-cholesterol diet. Soluble fiber can also help lower cholesterol. Fruits and vegetables are rich in fiber, vitamins, and minerals, and they are low calorie and nearly fat free. **Vitamin C** and beta-carotene, found in many fruits and vegetables, keep LDL-cholesterol from turning into a form that damages coronary arteries. Excess sodium can increase the risk of high blood pressure, and daily intake should be limited to 2,400 mg—about the amount in a teaspoon of salt.

Regular aerobic exercise can lower blood pressure, help control weight, and increase HDL ("good") cholesterol. Moderate intensity aerobic exercise lasting about 30 minutes four or more times per week is recommended for maximum heart health, according to the Centers for Disease Control and Prevention and the American College of Sports Medicine. Three 10-minute exercise periods are also beneficial. Aerobic exercise—activities such as walking, jogging, and cycling—uses the large muscle groups and forces the body to use oxygen more efficiently. It can also include everyday activities such as active gardening, climbing stairs, or brisk housework.

Maintaining a desirable body weight is also important. About one quarter of all Americans are overweight, and nearly one-tenth are obese, according to the Surgeon General's Report on **Nutrition** and Health. People who are 20% or more over their ideal body weight have an increased risk of developing coronary artery disease. Losing weight can help reduce total and LDL cholesterol, reduce triglycerides, and boost relative levels of HDL cholesterol.

Smoking has many adverse effects on the heart. It increases the heart rate, constricts major arteries, and can create irregular heartbeats. It also raises blood pressure, contributes to the development of plaque, increases the formation of blood clots, and causes blood platelets to cluster and impede blood flow. Heart damage caused by smoking can be repaired by quitting—even heavy smokers can return to heart health. Several studies have shown that ex-smokers face the same risk of heart disease as non-smokers within five to 10 years of quitting.

Drinking should be done in moderation. Modest consumption of alcohol can actually protect against coronary artery disease. This is believed to be because alcohol raises HDL ("good") cholesterol levels in some patients. The American Heart Association defines moderate consumption as one ounce of alcohol per day—roughly one cocktail, one 8-ounce glass of wine, or two 12-ounce glasses of beer. Excessive drinking is always bad for the heart. It usually raises blood pressure, and can poison the heart and cause abnormal heart rhythms or even heart failure. Illegal drugs, like cocaine, can seriously harm the heart and should never be used.

High blood pressure, one of the most common and serious risk factors for coronary artery disease, can be completely controlled through lifestyle changes and medication. People with moderate hypertension may be able to control it through lifestyle changes and medication.

Stress management means controlling mental and physical reactions to life's irritations and challenges. Techniques for controlling stress include thinking positively, getting enough sleep, exercising, and practicing relaxation techniques.

Daily aspirin therapy has been proven to help prevent blood clots associated with atherosclerosis. It can also prevent heart attacks from recurring, prevent heart attacks from being fatal, and lower the risk of strokes. Surprisingly, a 2002 study found that aspirin therapy is underused by people at risk for heart attacks. Patients should consult their doctors before taking aspirin regularly.

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National Heart, Lung, and Blood Institute Information Center. P.O. Box 30105, Bethesda, MD 20824-0105. http://www.nhlbi.gov/nhlbi/nhbli.htm.

Texas Heart Institute Heart Information Service. P.O. Box 20345, Houston, TX 77225-0345. 1-800-292-2221. http://www.tmc.edu/thi/his.html.

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Heart disease

Definition

Heart disease is the narrowing or blockage of the arteries and vessels that provide oxygen and nutrient-rich blood to the heart. It is caused by **atherosclerosis**, an accumulation of fatty materials on the inner linings of arteries that restricts blood flow. When the blood flow to the heart is completely cut off, the result is a **heart attack** because the heart is starved of oxygen.

Description

Heart disease, also called coronary heart disease or coronary artery disease, is the leading cause of death for both men and women in the United States. According to the American Heart Association, deaths from coronary heart disease in the United States declined 33 percent from 1994 to 2004, but more than 450,000 people still died from the disease in 2004. About 16 million Americans have active symptoms of coronary artery disease.

Heart disease occurs when the coronary arteries become partially blocked or clogged. This blockage limits the flow of blood through the coronary arteries, the major arteries supplying oxygen-rich blood to the heart. The coronary arteries expand when the heart is working harder and needs more oxygen. If the arteries are unable to expand, the heart is deprived of oxygen (myocardial **ischemia**). When the blockage is limited, chest **pain** or pressure called **angina** may occur. When the blockage **cuts** off the blood flow, the result is heart attack (myocardial infarction or heart muscle death).

Heart healthy diets

	Heart Healthy diet guidelines	Therapeutic Lifestyle Changes diet guidelines	American Heart Association diet guidelines
Saturated fat	8–10% of the day's total calories	Less than 7% of the day's total calories	Less than 7% of the day's total calories
Total fat	30% or less of the day's total calories	25–35% or less of the day's total calories from fat	25–35% or less of the day's total calories from fat
Dietary cholesterol	Less than 300 milligrams a day	Less than 200 milligrams a day	Less than 300 milligrams a day
Sodium	Less than 2,400 milligrams a day	Less than 2,400 milligrams a day	Less than 2,400 milligrams a day
Calories	Enough calories to achieve or maintain a healthy weight and reduce blood cholesterol level	Enough calories to achieve or maintain a healthy weight and reduce blood cholesterol level	Number of calories based on age, gender, height, weight, and physical activity level, and whether trying to lose, gain or maintain weight

A comparison of the dietary guidelines of the Healthy Heart diet, the Therapeutic Lifestyle Changes diet, and the American Heart Association diet. *(Illustration by GGS Information Services. Cengage Learning, Gale)*

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Risk factors for heart disease

Male greater than 45 years of age

Female greater than 55 years of age

Female with premature menopause without estrogen replacement

Family history of premature coronary heart disease having definite myocardial infarction or sudden death before age 55 in father or first-degree male relative, or mother before age 65 years of age

Currently smoking or history of cigarette smoking

Blood pressure greater than 140/90 mmHg or on antihypertensive medication

HDL cholesterol less than 35 mg/dl

LDL cholesterol greater than 130 mg/dl

Diabetes mellitus

(Illustration by Corey Light. Cengage Learning, Gale)

Healthy coronary arteries are open, elastic, smooth, and slick. The artery walls are flexible and expand to let more blood through when the heart needs to work harder. The disease process is thought to begin with an injury to the linings and walls of the arteries. This injury makes them susceptible to atherosclerosis and production of **blood clots** (thrombosis).

Causes and symptoms

Heart disease is usually caused by atherosclerosis. **Cholesterol** and other fatty substances accumulate on the inner wall of the arteries. They attract fibrous tissue, blood components, and **calcium**. They then harden into artery-clogging plaques. Atherosclerotic plaques often form blood clots that can also block the coronary arteries (coronary thrombosis). Congenital defects and **muscle spasms** of arteries or heart muscles also block blood flow. Some research indicates that infection from organisms such as **chlamydia** bacteria may be responsible for some cases of heart disease.

A number of major contributing risk factors increase the chance of developing heart disease. Some of these can be changed and some cannot. The greater the number of risk factors, the greater the chance of developing heart disease.

Major risk factors

Major risk factors significantly increase the chance of developing heart disease. These include:

- Heredity. People whose parents have heart disease are more likely to develop it. African Americans are also at increased risk because they experience a high rate of severe hypertension.
- Gender. Men are more likely to have heart attacks than women and to have them at a younger age. Above the age of 60, however, women have heart disease at a rate equal to that of men.
- Age. Men who are 45 years of age and older, and women who are 55 years of age and older are more likely to have heart disease. Occasionally, heart disease may strike men or women in their 30s. People more than 65 years old are more likely to die from a heart attack. Older women are twice as likely as older men to die within a few weeks of a heart attack.
- Smoking. Smoking increases both the chance of developing heart disease and the chance of dying from it. Smokers are more than twice as likely as non-smokers to have a heart attack and are two to four times more likely die from it.
- High cholesterol levels. Dietary sources of cholesterol are meat, dairy food, eggs, and other animal-fat products. Cholesterol is also produced by the body. Age, body fat, diet, exercise, heredity, and sex affect one's blood cholesterol. For typical, healthy patients, the American Heart Association recommends a total blood cholesterol below 200 mg/dL, which puts the person at a comparatively low risk for coronary heart disease. For these individuals, a total cholesterol level of 200–239 mg/dL is considered borderline high-risk, and a level of 240 mg/dL or above is considered high risk and doubles the risk for coronary heart disease. Persons with such risk factors as elevated low-density lipoprotein (LDL cholesterol, or "bad" cholesterol) levels, low high-density lipoprotein (HDL or "good" cholesterol) levels, or high triglyceride levels should consult with their doctor about what their target cholesterol level should be.
- High blood pressure. High blood pressure makes the heart work harder and weakens it over time. It increases the risk of heart attack, stroke, kidney failure, and congestive heart failure. A blood pressure of 140 over 90 or above is considered high. The risk of heart attack or stroke is raised several times for people with high blood pressure combined with

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obesity, smoking, high cholesterol levels, or diabetes. Nearly one-third of American adults have high blood pressure.

- Lack of physical activity. Lack of exercise increases the risk of heart disease. Even modest physical activity, such as walking, is beneficial if done regularly.
- Diabetes mellitus. The risk of developing heart disease is seriously increased for diabetics. About two-thirds of people who have type I or type II diabetes die as the result of a heart attack or stroke.

Contributing risk factors

Contributing risk factors have been linked to heart disease, but their significance was not known as of 2008. Contributing risk factors are:

- Obesity. Excess weight increases the strain on the heart and increases the risk of developing heart disease even if no other risk factors are present. Obesity increases blood pressure and blood cholesterol and can lead to diabetes.
- Hormone replacement therapy (HRT). Even though physicians once believed that HRT could help prevent heart disease in women, the Women's Health Initiative (WHI) released information in 2002 and 2003 showing that use of combined hormones (estrogen and progestin) is harmful in women who already have coronary artery disease. As of 2008, it continued to be debated if HRT, and estrogen in particular, can provide some protection against heart disease when a woman takes it soon after going through menopause.
- Stress and anger. Some scientists believe that poorly managed stress and anger can contribute to the development of heart disease and increase the blood's tendency to form clots (thrombosis). Stress increases the heart rate and blood pressure and can injure the lining of the arteries.
- Chest pain (angina). Angina is the main symptom of coronary heart disease, but it is not always present. Other symptoms include shortness of breath, chest heaviness, tightness, pain, a burning sensation, squeezing, or pressure either behind the breastbone or in the left arm, neck, or jaws. According to the American Heart Association, 64 percent of women and 50 percent of men who died suddenly of heart disease had no previous symptoms of the disease.

Diagnosis

Diagnosis begins with a doctor's review of the medical history, discussion of symptoms, listening to the heart, and performing basic screening tests. These tests measure blood lipid levels, blood pressure, **fasting** blood-glucose levels, weight, and other indicators. Other diagnostic tests include resting and **exercise** electrocardiograms, echocardiography, radionuclide scans, and coronary angiography. The treadmill exercise (**stress**) test is an appropriate screening test for those with high risk factors even though they feel well.

An electrocardiogram (ECG) shows the heart's activity and may reveal a lack of oxygen (ischemia). Electrodes covered with conducting jelly are placed on the patient's chest, arms, and legs. They send impulses of the heart's activity through an oscilloscope (a monitor) to a recorder that traces them on paper. Another type of electrocardiogram, known as the exercise stress test, measures how the heart and blood vessels respond to exertion when the patient is exercising on a treadmill or a stationary bike. Both tests can be performed in a physician's office or outpatient facility.

Echocardiography, or cardiac ultrasound, uses sound waves to create an image of the heart's chambers and valves. A technician applies gel to a handheld transducer and then presses it against the patient's chest. The heart's sound waves are converted into an image that can be displayed on a monitor. It does not reveal the coronary arteries themselves but can detect abnormalities in the heart wall caused by heart disease. Typically performed in a doctor's office or outpatient facility, the test takes 30 to 60 minutes.

Radionuclide angiography enables physicians to see the blood flow of the coronary arteries. Nuclear scans are performed by injecting a small amount of radiopharmaceutical, such as thallium, into the bloodstream. As the patient lies on a table, a camera that uses gamma rays to produce an image of the radioactive material passes over the patient and records pictures of the heart. Radionuclide angiography is usually performed in a hospital's nuclear medicine department. The radiation exposure is about the same as that in a chest x ray.

Coronary angiography is considered the most accurate method for making a diagnosis of heart disease, but it is also the most invasive. During coronary angiography the patient is awake but sedated. The cardiologist inserts a catheter into a blood vessel and guides it into the heart. A contrast dye (a radiopaque substance that is visible on x ray) is injected into the catheter and x rays are taken. Coronary angiography is performed in a cardiac catheterization laboratory in either an outpatient or an inpatient surgery unit.

Treatment

Herbal-medicine practitioners recommend a variety of remedies that may have a beneficial effect on

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heart disease. They may suggest **garlic** (*Allium sativum*), **myrrh** (*Commiphora molmol*), and oats (*Avena sativa*) to help reduce cholesterol, and **hawthorn** (*Crataegus* spp.), linden (*Tilia europaea*), and **yarrow** (*Achillea millefolium*) to control high blood pressure, a risk factor for heart disease. Tea, especially **green tea** (*Camellia sinensis*), is high in **antioxidants** and studies have shown that it may have a preventative effect against atherosclerosis. Coenzyme Q10 has been shown to be beneficial for patients with congestive heart failure. Taurine, an amino acid found in meat and fish proteins, has also been suggested as a way to treat heart arrhythmia.

Some alternative-medicine practitioners believe that **yoga** and other bodywork, massage, **relaxation**, **aromatherapy**, and music therapies may also help prevent heart disease and stop, or even reverse, the progression of atherosclerosis. Vitamin and mineral supplements that are believed to reduce, reverse, or protect against heart disease include B-complex vitamins, calcium, **chromium**, **magnesium**, L-carnitine, **zinc**, and the antioxidant vitamins C and E. Notably, a study in 2004 showed a relationship between high doses of supplemental **vitamin C** and reduced coronary heart disease but found little risk reduction with supplemental **vitamin E**.

Traditional Chinese medicine (TCM) may recommend herbal remedies, massage, **acupuncture**, and dietary modification. A healthy diet (including cold water fish as a source of **essential fatty acids**) and exercise are important components of both alternative and conventional prevention and treatment strategies.

New reports on diet and heart disease have answered some questions, but others remain unclear. While one study concludes that four servings per day of fruit and vegetables are associated with a slight drop in risk of heart disease, eight or more servings per day can produce a significant drop in risk. Another study showed that consuming legumes at least four times per week lowered risk of heart disease from 11 percent to 22 percent compared with consuming legumes less than once a week. Research on antioxidants continued as of 2008 to produce mixed findings, with some reports showing that vitamins E, C, and other antioxidants can help prevent heart disease, and other studies showing they have no effect. Although scientists and medical professionals had not reached a consensus about the benefits of antioxidants as of 2008, the American Heart Association reported that up to 30 percent of Americans take antioxidant supplements. As of 2008, however, the association did not recommend supplements. Instead, it advised a diet containing a variety of nutrient-rich foods, including fruits, vegetables, whole grains, and nuts.

Allopathic treatment

Heart disease can be treated many ways. The choice of treatment depends on the patient and the severity of the disease. Treatments include lifestyle changes and drug therapy and coronary artery bypass surgery. (Recommendations for persons with coronary artery disease are available through the American Heart Association Web site at http://www.americanheart.org/presenter.jhtml?identifier=3039477.) These, however, are not a cure. Heart disease is a chronic disease requiring lifelong care.

Another treatment option is percutaneous transluminal coronary angioplasty, usually called coronary angioplasty, which is a non-surgical procedure. A catheter tipped with a balloon is threaded from a blood vessel in the thigh into the blocked artery. The balloon is inflated, compressing the plaque and opening the blocked artery. The balloon is then deflated and the catheter removed.

People with moderate heart disease may gain adequate control through lifestyle changes and drug therapy. Drugs such as nitrates, beta-blockers, and calcium channel blockers relieve chest pain and complications of heart disease, but they cannot clear blocked arteries. Nitrates improve blood flow to the heart, and beta-blockers reduce the amount of oxygen required by the heart during stress. Calcium channel blockers help keep the arteries open and reduce blood pressure.

Aspirin helps prevent blood clots from forming on plaques, reducing the likelihood of a heart attack and **stroke**. Cholesterol-lowering medications are also indicated in many cases.

Coronary angioplasty is successful about 90 percent of the time, but for about one-third of patients, the artery narrows again within six months. The procedure can be repeated. It is less invasive and less expensive than coronary artery bypass surgery.

In coronary artery bypass surgery, a healthy vein from an arm, leg, or chest wall is used to build a bypass around the coronary artery blockage. The healthy vessel then supplies oxygen-rich blood to the heart. Bypass surgery is major surgery. It is appropriate for those patients with blockages in two or three major coronary arteries, those with severely narrowed left main coronary arteries, and those who have not responded to other treatments. The majority of patients who have bypass surgery experience full relief from angina, and many of the remainder experience partial relief. A study in 2004 also noted that patients who had serious coronary artery disease had better

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five-year survival rates with a bypass than they did with balloon angioplasty or stent procedures.

Three other surgical procedures for unblocking coronary arteries are available. Atherectomy is a procedure in which the cardiologist shaves off and removes strips of plaque from the blocked artery. In laser angioplasty, a catheter with a laser tip is inserted into the affected artery to burn or break down the plaque. A metal coil called a stent can be implanted permanently to keep a blocked artery open. As of 2008, stenting was becoming more common.

Expected results

Advances in medicine and the adoption of healthier lifestyles have caused a substantial decline in death rates from heart disease since the mid-1980s. New diagnostic techniques enable doctors to identify and treat heart disease in its earliest stages. New technologies and surgical procedures have extended the lives of many patients who would have otherwise died. Research on heart disease continued as of 2008.

Prevention

A healthy lifestyle can help prevent heart disease and slow its progress. A heart-healthy lifestyle includes maintaining a healthy diet and weight, performing regular exercise, refraining from **smoking**, engaging in moderate drinking, controlling **hypertension**, and managing stress. Cardiac rehabilitation programs are excellent ways to help prevent recurring coronary problems for people who are at risk and who have had coronary events and procedures.

Eating right

A healthy diet includes a variety of foods that are low in fat, especially saturated fat, low in cholesterol, and high in fiber. It includes plenty of fruits and vegetables and limited salt. According to the American Heart Association, fats should comprise no more than 25 to 35 percent of the total daily calories and should total less than 7 percent saturated fats, less than 1 percent trans fats, and the remainder as monounsaturated and polyunsaturated fats from such sources as nuts, seeds, fish and vegetable oils. Cholesterol intake should be limited to 300 mg per day for the average person. Those individuals who have coronary heart disease or who have an LDL cholesterol level of 100 mg/dL or more, should lower their daily cholesterol intake to less than 200 mg per day. Eating cold-water fish or taking comparable omega-3 polyunsaturated fatty acid supplements can help prevent cardiac death. The American Heart Association advocates eating fish (particularly fatty fish) at least twice a week. It also recommends adding soybeans (including tofu), canola, walnut, and **flaxseed**, and their oils to the diet because these contain alpha-linolenic acid than can transform into omega-3 fatty acid in the body. The association also notes that individuals consult with their doctor before taking omega-3 fatty acid supplements in excess of 3 grams per day because of the potential for bleeding.

Cholesterol, a waxy substance containing fats, is found in foods such as meat, dairy, eggs, and other animal products. It is also produced in the liver. Soluble fiber can help lower cholesterol. Dietary cholesterol should be below 300 milligrams per day. Many popular lipid-lowering drugs can reduce LDL cholesterol by an average of 25 to 30 percent, or more, when used with a low-fat, low-cholesterol diet.

Antioxidants are chemical compounds in plant foods. When people eat antioxidant-rich foods, they may improve the function of the arteries and prevent arterial plaque formation and reduce their risk of **cancer**. Colorful vegetables and fruits are sources of antioxidants and are rich in fiber, vitamins, and minerals. They are low in calories and nearly fat-free. Vitamin C and beta-carotene, found in many fruits and vegetables, keep LDL-cholesterol from turning into a form that damages coronary arteries. Whole grains, especially whole oats and oat bran, reduce cholesterol.

Excess **sodium** can increase the risk of high blood pressure. Many processed foods contain large amounts of sodium. Daily intake should be limited to about 2,300 milligrams, about the amount in a teaspoon of salt.

The Food Guide Pyramid developed by the Center for **Nutrition** Policy and Promotion, an organization of the U.S. Department of Agriculture, provides easy-to-follow guidelines for daily heart-healthy eating.

Exercising regularly

Aerobic exercise can lower blood pressure, help control weight, and increase HDL (good) cholesterol. It also may keep the blood vessels more flexible. The American Heart Association recommends moderate-to-vigorous intensity aerobic activity (50 to 85 percent of the maximum heart rate) for at least 30 minutes on most days of the week. Those 30 minutes can be divided into two 15-minute or three 10-minute sessions throughout the day. People with heart disease or risk factors should consult a doctor before beginning an exercise program.

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Maintaining a desirable body weight

People who are 20 percent or more above their ideal body weight have an increased risk of developing heart disease. Losing weight can help decrease total and LDL cholesterol, reduce triglycerides, and boost HDL cholesterol. It may also reduce blood pressure. Eating right and exercising are two essential components of losing weight.

Quitting smoking

Smoking has many adverse effects on the heart. It increases the heart rate, constricts major arteries, and can create irregular heartbeats. It also raises blood pressure, contributes to the development of plaque, increases the formation of blood clots, and causes blood platelets to cluster and impede blood flow. When smokers quit the habit, heart damage can be repaired. Several studies have shown that ex-smokers face the same risk of heart disease as non-smokers within 5 to 10 years after they quit.

Drinking in moderation

Modest consumption of alcohol may actually protect against heart disease because alcohol appears to raise levels of HDL cholesterol. The American Heart Association defines moderate consumption as one to two daily drinks for men and one daily drink for women, or one ounce of alcohol per day. The association defines one drink as 4 ounces of wine, 12 ounces of beer, 1.5 ounces of 80-proof spirits, or 1 ounce of 100-proof spirits.

Seeking diagnosis and treatment for hypertension

High blood pressure, one of the most common and serious risk factors for heart disease, can be completely controlled through lifestyle changes and medication. Seeking diagnosis and treatment is critical because hypertension often exhibits no symptoms, so many people do not know they have it. Moderate hypertension can be controlled by reducing dietary intake of sodium and fat, exercising regularly, managing stress, abstaining from smoking, and drinking alcohol in moderation.

Managing stress

Everyone experiences stress. Stress can sometimes be avoided and, when it is inevitable, it can be managed through relaxation techniques, exercise, and other methods.

KEY TERMS

Angina—Chest pain that occurs when diseased blood vessels restrict the flow of blood to the heart. Angina is often the first symptom of heart disease.

Atherosclerosis—A process in which the openings in the coronary arteries narrow due to the accumulation of plaque on the linings of the blood vessels. Atherosclerosis is the cause of heart disease.

Beta-blocker—A drug that blocks some of the effects of fight-or-flight hormone adrenaline (epinephrine and norepinephrine), slowing the heart rate and lowering the blood pressure.

Calcium channel blocker—A drug that blocks the entry of calcium into the muscle cells of small blood vessels (arterioles) and keeps them from narrowing.

Coronary arteries—The main arteries that provide blood to the heart. The coronary arteries surround the heart like a crown, coming out of the aorta, arching down over the top of the heart, and dividing into two branches. These are the arteries in which heart disease occurs.

HDL cholesterol—High-density lipoprotein cholesterol is a component of cholesterol that helps protect against heart disease. HDL is nicknamed "good cholesterol."

LDL cholesterol—Low-density lipoprotein cholesterol is the primary cholesterol molecule. High levels of LDL increase the risk of coronary heart disease. LDL is nicknamed "bad cholesterol."

Plaque—A deposit of fatty and calcium substances that can accumulate dangerously in the lining of the artery wall.

Triglyceride—A fat that comes from food or is made from other energy sources in the body. Elevated triglyceride levels contribute to the development of atherosclerosis.

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ORGANIZATIONS
American Heart Association, National Center, 7272 Greenville Avenue, Dallas, Texas, 75231, (800) AHA-USA1, http://www.americanheart.org/.

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Heartburn

Definition

Heartburn is a burning sensation in the chest that can extend to the neck, throat, and face. It usually occurs after eating and is worsened by bending, lifting, or lying down.

Description

Heartburn, sometimes called acid **indigestion** or gastroesophageal reflux, is very common. More than one third of the population suffers from occasional heartburn, as do about one half of pregnant women. Some 50 million adult Americans complain of frequent heartburn. The occurrence of heartburn generally increases with age; however, it is common—and often overlooked—in infants and children.

Heartburn occurs when digestive juices from the stomach move back up into the esophagus, the tube connecting the throat to the stomach. The upper third of the esophagus consists of skeletal muscle that propels the food downward. The lower two-thirds of the esophagus is smooth muscle. The lower esophageal sphincter (LES) is a thick band of muscle that encircles the esophagus just above the uppermost part of the stomach. This sphincter is usually tightly closed—opening only when food passes from the esophagus into the stomach—and prevents the contents of the stomach from moving back into the delicate esophageal tissue. The stomach has a thick mucous coating that protects it from the strong hydrochloric acid it secretes to digest food. However the much-thinner esophageal mucous coating does not protect against stomach acid. Thus, if the LES opens inappropriately or fails to close completely, stomach acids can back up and burn the esophagus, causing heartburn.

Occasional heartburn is usually harmless. However, frequent or chronic heartburn (recurring more than twice per week) is called gastroesophageal reflux disease (GERD) and requires early management. Repeated episodes of GERD can lead to esophageal inflammation (esophagitis). If the esophagus is repeatedly subjected to stomach acid and **digestive enzymes**, ulcerations, scarring, and thickening of the esophageal walls can result. This causes a narrowing of the interior of the esophagus that can affect swallowing and the peristaltic movements that send food downward. Repeated esophageal irritation also can result in Barrett's syndrome—changes in the types of cells lining the esophagus. Barrett's esophagus can develop into esophageal **cancer**.

Nighttime heartburn, affecting about 80% of heartburn sufferers, is more damaging to the esophagus than daytime heartburn. It often interferes with sleep and may trigger symptoms in **asthma** sufferers.

Gastroesophageal reflux may occur in children under age one, particularly pre-term babies or those with **cerebral palsy**. It also may be a cause of some migraine headaches. In addition, chronic heartburn can be a symptom of a gastric ulcer or coronary artery disease.

Causes and symptoms

Causes

Heartburn is caused by:

- a relaxed LES that does not close properly
- over-production of stomach acid
- increased stomach pressure
- a damaged esophagus with increased acid sensitivity

Many factors can contribute to LES malfunction:

- irregular eating, skipping meals
- smoking
- caffeine
- stress
- some medications, including diazepam (Valium), meperidine (Demerol), theophylline, morphine, prostaglandins, calcium channel blockers, nitrate heart medications, progesterone, and anticholinergic and adrenergic drugs (drugs that limit nerve reactions)
- paralysis and scleroderma (an autoimmune disease that hardens body organs)

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KEY TERMS

Antacid—Common medication that neutralizes stomach acid for the short-term treatment of heartburn.

Barrett's esophagus or Barrett's syndrome—Changes in the type of cells lining the esophagus. Sometimes associated with the development of esophageal cancer.

Digestive enzymes—Proteins that catalyze the breakdown of large molecules (usually food) into smaller molecules.

Endoscopy—Procedure in which a thin, flexible scope is placed down the esophagus to examine, biopsy, and/or suture the tissue.

Esophagitis—Inflammation of the esophagus.

Esophagus—Muscular tube, about 10 in (25 cm) long, connecting the throat to the stomach.

Fundoplication—Surgical procedure that increases pressure on the LES (lower esophageal sphincter), reducing reflux.

Gastroesophageal reflux—Upward flow of stomach contents into the esophagus, causing heartburn.

Gastroesophageal reflux disease (GERD)—Frequent (more than twice a week) gastroesophageal reflux.

Hiatal hernia—Protrusion of part of the stomach through the diaphragm to a position next to the esophagus.

Hiatus—Opening in the diaphragm through which the stomach connects to the esophagus.

Histamine receptor 2 (H2) blocker—Heartburn medication that reduces the production of stomach acid.

Lower esophageal sphincter (LES)—Muscle at the base of the esophagus that opens to allow food to enter the stomach and closes to prevent reflux back into the esophagus.

Manometry—Procedure that measures pressure. In esophageal manometry, a thin, flexible catheter is placed down the esophagus to measure pressure at various points.

Peristalsis—Sequence of muscle contractions that progressively squeezes the digestive tract to push food along.

Proton pump inhibitor (PPI)—Medication that inhibits stomach acid production in severe heartburn.

Ulceration—Wound or abrasion of surface tissue.

- large meals that distend the stomach and prevent the LES from closing
- alcohol, which lowers the pressure on the LES, allowing it to relax and open. Alcohol also may irritate the esophageal lining
- weakening LES and loss of LES muscle tone with increasing age

Hiatal hernias are common among pregnant women, smokers, the obese, and those over age 50. The hiatus is an opening in the diaphragm (the large muscle that separates the chest cavity and the abdomen) through which the esophagus connects to the stomach. If the hiatus loses its tautness and shape, the stomach may protrude through, forming a pocket just below the LES where stomach acid can be trapped. These hiatal hernias can cause the LES to relax and open. Hiatal hernias may result in frequent and severe heartburn and GERD.

Various factors can increase stomach pressure, causing gastroesophageal reflux:

- obesity
- lying down within one or two hours of eating
- tight clothing
- Pregnancy causing the enlarged uterus to displace the stomach, delaying the removal of stomach contents

Eating too fast, chewing insufficiently, and **smoking** all increase stomach acid production. Smoking also dries up saliva that protects the esophagus from acid.

Many foods are known to contribute to heartburn:

- greasy, fried, or fatty foods
- spicy foods
- black pepper
- acidic foods such as tomatoes, pickles, and vinegar
- chocolate
- coffee with or without caffeine
- Peppermint or other mints

Symptoms

Heartburn itself is a symptom of gastroesophageal reflux and GERD. Heartburn sufferers may salivate excessively or regurgitate stomach contents into their mouths, leaving a sour or bitter taste.

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Other symptoms of GERD include:

- difficult or painful swallowing
- sore throat
- hoarseness, laryngitis, wheezing, coughing
- pneumonia
- gingivitis, bad breath
- earache

Diagnosis

Heartburn usually is diagnosed by patient histories, symptoms, and clinical assessments. Additional procedures may be used to confirm the diagnosis, assess damage to the esophagus, and monitor the healing progress. The following diagnostic procedures are appropriate for anyone with frequent, chronic, or difficult-to-treat heartburn, or complicating GERD symptoms as listed above.

Esophageal manometry uses a thin, flexible catheter placed down the esophagus. Small openings in the catheter sense pressure at various points on the esophagus while the muscle is at rest and during swallowing. The pressures are transmitted to a computer that analyzes the wave patterns.

An upper gastrointestinal (GI) series, or "barium swallow," can reveal esophageal narrowing, ulcerations, tumors, **hiatal hernia**, or reflux episodes as they occur. X rays are taken after a patient swallows a barium (a chemical element) suspension. This procedure takes about 15 minutes. However it cannot detect structural changes associated with different degrees of esophagitis.

Upper GI endoscopy uses a thin, flexible tube to view the inside of the esophagus directly. It is performed by a gastroenterologist, a physician specializing in diagnosis and treatment of disorders of the gastrointestinal tract, or by a gastrointestinal endoscopist. Upper GI endoscopy enables the physician to distinguish the degree of esophagitis and provides an accurate profile of esophageal damage. This procedure may include a biopsy—the removal of a small piece of tissue—to examine for Barrett's syndrome or malignancies. Patients with Barrett's esophagus may have frequent examinations of the esophageal lining for early detection of precancerous cells.

Other diagnostic tests include measurements of esophageal acidity (pH), usually over a 24-hour period, using an ambulatory acid probe. The patient is given a large capsule containing an acid-sensing probe, a battery, and a transmitter. Acid in the esophagus is measured by the probe, which then transmits the information to a recorder that the patient is wearing on his belt.

Note: A burning sensation in the chest is usually heartburn and is not associated with the heart itself. About 15 percent of the annual six million U. S. emergency room visits for chest **pain** are due to heartburn. However, **angina** (one type of temporary chest pain, pressure, or discomfort) sometimes is mistaken for severe heartburn. Chest pain that radiates into the arms and is not accompanied by regurgitation is a warning sign of a possible serious heart problem. Persistent chest pain should always be evaluated by a physician.

Treatment

Herbal remedies

These herbal remedies may be used to treat heartburn:

- ginger (*Zingiber officinalis*) as a tea or candied. (Ginger may cause heartburn in some people.)
- chamomile (*Matricaria chamomilla*) tea
- slippery elm (*Ulmus fulva*) tea
- cinnamon tea
- anise (*Pimpinella anisum*), caraway, dill, and/or fennel seed tea
- cardamom (*Elettaria cardamomum*) on buttered raisin toast
- turmeric (*Curcuma domestica*) added to warm water
- marsh mallow root (*Althaea officinalis*)
- licorice (*Glycyrrhiza glabra*), especially deglycyrrhizinated licorice (DGL) (The capsules or tablets may be dissolved in the mouth or in tea or two to four chewable 380-mg wafers are taken about 20 minutes before eating. DGL should not be used more than three times per week, as repeated use can be toxic.)
- peppermint tea (Peppermint also can cause heartburn by relaxing the LES.)
- Ayurvedic (traditional East Indian) herbs

Homeopathic remedies

Homeopathic remedies for heartburn include:

- *Calcarea carbonica*
- *Nux vomica* after eating spicy foods
- *Carbo vegetalis* after eating rich foods
- *Arsenicum album* for burning pain
- *Natrum muriaticum* for nervousness, tension, and pain
- *Zinc metallicum* after eating too fast

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Other remedies

A variety of other remedies and therapies may be used to treat heartburn:

- Sodium bicarbonate (baking soda) reduces esophageal acidity immediately. However, its effect is short-lived and it should not be used by people on sodium-restricted diets.
- Nutritional remedies include carrots, celery, angelica, fennel, and/or parsley. These can be combined in a juice taken before meals.
- Acupressure points Stomach 36, Spleen 6, Pericardium 6, and Conception Vessel 12. CV 12 should not be pressed just after eating or during pregnancy.
- In Chinese medicine, foods and herbs that balance and cool the qi (Chinese term for universal life energy), including radishes, radish seed, citrus fruit peels, and cardamom.
- Walking after a meal.
- Chewing gum after eating to help produce saliva for soothing the esophagus and washing acid back into the stomach.
- Relaxation therapy, visualization, and deep breathing.

Allopathic treatment

Drugs

Occasional heartburn is commonly treated with nonprescription antacids that neutralize the pH of stomach acid. The neutralized acid does not burn the esophagus. Antacids usually work within 15 minutes and their effects last one to two hours. Liquid or dissolving antacids usually are faster acting than tablets. However, antacids, if taken for too long, can cause side effects including **diarrhea** or **constipation**.

Some antacids interfere with medications for kidney or **heart disease**. Heartburn sufferers with two or more episodes per week, or with an episode lasting longer than three weeks, should not rely on antacids as the sole treatment, since they may be at risk of kidney damage or other metabolic changes.

Common antacids include Maalox, Mylanta, Alka-Seltzer, Pepto-Bismol, Riopan, and Rolaids. The active ingredient in antacids such as Tums is **calcium** carbonate. Alginate (Gaviscon) is a foaming agent that coats the esophagus and the stomach to help prevent reflux. Other antacids are made from aluminum hydroxide, magaldrate, or **magnesium** hydroxide. Some antacids contain baking soda (**sodium** bicarbonate), which may interfere with vitamin and mineral absorption during **pregnancy**.

Histamine receptor (H2) blockers, such as famotidine (Pepcid), ranitidine (Zantac), nizatidine (Axid), and cimetidine (Tagamet), decrease stomach acid secretion. They relieve heartburn in about 75% of users. However, they take 30 to 45 minutes to act and usually are taken two to four times daily for several weeks. H2 blockers are both over-the-counter (OTC) and prescription medicines. They may have side effects or interactions with other medications.

Proton pump inhibitors (PPI) are for severe heartburn. They are the most effective drugs for inhibiting acid production and allowing the esophagus to heal in GERD. It may take up to five days for PPIs to take effect. They cannot be used by people with kidney or liver problems. Although it appears safe to take PPIs for at least 10 years, the lowest effective dosage reduces the risk of side effects that may include **headache**, diarrhea, stomach pain, and interactions with other medications. Common PPIs include lansoprazole (Prevacid), omeprazole (Prilosec), rabeprazole (Aciphex), pantoprazole (Protonix), and esomeprazole (Nexium). Prilosec OTC is available in 20-milligram doses to be taken once a day for 14 days to treat frequent heartburn.

Prokinetics are drugs that strengthen the LES (lower esophageal sphincter) and increase the rate of stomach emptying. These include metoclopramide (Reglan) and bethanechol (Urecholine). These drugs frequently have side effects.

Surgery

Laparoscopic Nissen fundoplication is a surgical procedure to increase pressure on the LES by stretching and wrapping the upper part of the stomach around it. It is performed under a general anesthetic and takes one to two hours. The complete recovery period is less than two weeks.

GERD (gastroesophageal reflux disease) may be treated successfully by endoscopic suturing of the weakened LES to stop acid reflux. Studies have shown that symptoms usually improve with this procedure and the use of medications declines. Another procedure involves using electrodes to make tiny **cuts** in the LES tissues. The resulting scarring tightens the LES. These outpatient procedures take less than an hour. They are not used in cases of hiatal hernia or Barrett's esophagus.

If the esophagus has become narrowed and badly scarred from stomach acid, a procedure that stretches and widens the esophageal tissue may be used along with acid-suppressing medication. Enteryx is a liquid

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that can be injected into the LES where it forms a spongy muscle implant that strengthens the LES.

Prognosis

Occasional heartburn, without esophageal damage, has an excellent prognosis. Esophageal damage that is treated with a program that promotes healing also has an excellent prognosis. Infants usually outgrow gastroesophageal reflux by age one.

Untreated heartburn and GERD may lead to bleeding, esophageal ulcers, and **infections**. With treatment, the damaged tissue that forms ulcers can heal. About ten percent of patients with GERD experience esophageal narrowing from acid damage that leads to the formation of scar tissue in the lower esophagus. GERD also can cause **laryngitis**, **bronchitis**, and aspiration **pneumonia**. After five years of heartburn, the risk of developing Barrett's esophagus increases. About five percent of GERD patients have Barrett's syndrome. This condition is incurable and may lead to cancer. The prognosis for esophageal cancer is very poor. There is a strong likelihood of painful illness and a less than five percent chance of survival for more than five years.

Prevention

Due to the risk of GERD, Barrett's syndrome, and esophageal cancer, prevention of heartburn is very important. Heartburn usually is preventable with dietary and lifestyle changes.

Dietary adjustments to eliminate many causes of heartburn include:

- eating smaller, more frequent meals to reduce pressure on the LES
- eating slowly, chew thoroughly, and take deep breaths between bites
- avoiding caffeine, chocolate, onions, spicy foods, and mint, all of which tend to increase stomach acid and relax the LES
- avoiding fatty, fried, and greasy foods. Fatty foods relax the LES and slow stomach emptying, and fat consumption has been linked to GERD
- avoiding milk, garlic, peppers, and carbonated beverages
- avoiding nicotine
- avoiding citrus fruits and juices and tomato-based foods, which are acidic and can irritate an inflamed esophagus
- replacing meat at dinner with carbohydrates and easier-to-digest proteins such as rice, beans, and pastas
- avoiding alcohol
- adding the spice annato (*Bix orellana*) or bouquet garni to foods
- drinking tea made with crushed caraway seeds with meals
- controlling body weight

Lifestyle changes that can alleviate heartburn include:

- avoiding drugs known to contribute to heartburn, including aspirin or other nonsteroidal anti-inflammatories
- avoiding clothing that fits tightly around the abdomen
- not lying down until the stomach is empty—within about three hours of eating
- elevating the head of the bed six to nine inches to prevent nighttime heartburn
- avoiding strenuous exercise for two to three hours after a meal

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American Gastroenterological Association (AGA). 4930 Del Ray Avenue, Bethesda, MD 20814. (310 654-2055. http://www.gastro.org/.

National Digestive Diseases Information Clearinghouse. 2 Information Way, Bethesda, MD 20892–3570. (800) 891-5389. (301)654-3810. nddic@info.niddk.nih.gov. http://digestive.niddk.nih.gov/.

The National Heartburn Alliance. 303 East Wacker Drive, Suite 440, Chicago, IL 60601. (877) 471-2081.nhbain formation@heartburnalliance.org. http://www.heart burnalliance.org/.

Margaret Alic, PhD

Heavy metal poisoning

Definition

Heavy metal poisoning is the toxic accumulation of heavy metals in the soft tissues of the body.

Description

The term "heavy metal" has been defined in a number of ways. By one definition, a heavy metal is any chemical element with a specific gravity (a measure of density) greater than 4.0. Any toxic metal, no matter what its specific gravity, may also be called a heavy metal. The heavy metals most often implicated in human poisoning are lead, mercury, arsenic, and cadmium. Some heavy metals, such as **zinc**, **copper**, **chromium**, **iron**, and **manganese**, are required by the body in small amounts but can be toxic in larger quantities. Heavy metals may enter the body through food, water, or air, or by absorption through the skin. Once in the body, they compete with and displace essential minerals such as zinc, copper, **magnesium**, and **calcium**, and interfere with organ system function. People may come in contact with heavy metals in industrial work, pharmaceutical manufacturing, and agriculture. Children may be poisoned as a result of playing in contaminated soil.

Sources of exposure for some heavy metals include the following:

- lead: old paint, leaded gasoline, old pipes
- mercury: contaminated fish and industrial and agricultural wastes
- cadmium: industrial waste, insecticides, old galvanized pipes
- arsenic: insecticides and industrial processes, even drinking water

Causes and symptoms

Symptoms of heavy metal poisoning vary, depending on the nature and quantity of the heavy metal and whether it was ingested or inhaled. Patients who ingest a heavy metal may complain of cramps, **nausea**, **vomiting**, **diarrhea**, stomach **pain**, **headache**, sweating, and a metallic taste in the mouth. Mercury can cause skin **burns** if it has touched the skin, and inhaled mercury vapor can cause severe inflammation of the lungs. If lead is inhaled in the form of lead dust, **insomnia**, headache, mania, and convulsions may occur. In severe cases of heavy metal poisoning, patients exhibit obvious impairment of cognitive, motor, and language skills. The expression "mad as a hatter" comes from the **mercury poisoning** prevalent in seventeenth-century France among hatmakers who soaked animal hides in a solution of mercuric nitrate to soften the hair.

Diagnosis

Heavy metal poisoning may be detected using blood, urine, and stool tests, hair and tissue analysis, or x rays. In children, blood lead levels above 80 mcg/dL generally indicate **lead poisoning**. However, significantly lower levels (30 mcg/dL) can cause mental retardation and other cognitive and behavioral problems in chronically exposed children. The Centers for Disease Control and Prevention considers a blood lead level of 10 mcg/dL or higher in children a cause for concern. In adults, symptoms of lead poisoning are usually seen when blood lead levels exceed 80 mcg/dL for a number of weeks. Blood levels of mercury should not exceed 3.6 mcg/dL, whereas urine levels should not exceed 15 mcg/dL. Symptoms of mercury poisoning may appear when mercury levels exceed 20 mcg/dL in blood and 60 mcg/dL in urine. Some authorities have recommended testing of hair to determine mercury levels in the body. As of 2008, however, such tests were believed to have questionable value at best.

Since arsenic is rapidly cleared from the blood, blood arsenic levels may not be very useful in diagnosis. Arsenic in the urine (measured in a 24-hour collection following 48 hours without eating seafood) may exceed 50 mcg/dL in people with arsenic poisoning. If

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acute arsenic poisoning is suspected, an x ray may reveal ingested arsenic in the abdomen (since arsenic is opaque to x rays). Arsenic may also be detected in the hair and nails for months following exposure. Cadmium toxicity is generally indicated when urine levels exceed 10 mcg/dL of creatinine and blood levels exceed 5 mcg/dL.

Treatment

Emergency treatment for acute poisoning, especially in children, can be handled by calling a poison control line at (800) 222-1222, or by dialing 911. Alternative practitioners often rely on the same chelating agents used by medical doctors to treat heavy metal poisoning, but they also use natural supplements and additional techniques to assist the body's own **detoxification** processes. One highly contested issue between alternative medicine and mainstream dentistry concerns mercury poisoning. Alternative practitioners believe that there is a large body of evidence suggesting that silver amalgam tooth fillings, which contain mercury, are a major factor in mercury poisoning. For individuals with high mercury levels in their bodies, they recommend that all mercury-containing tooth fillings be removed by a holistic dentist. A large number of studies have been conducted on the relationship of mercury from dental amalgams and human health. A comprehensive review of such studies conducted between 1996 and 2004 found "little evidence to support a causal relationship between mercury fillings and human health problems." Authors of the report noted, however, that further research was needed to obtain a definitive answer about the issue.

Dietary changes are used to support the treatment of heavy metal poisoning. Detoxification **diets** are predominantly vegetarian and reduce or avoid foods that may **stress** the immune system, such as processed foods, fried foods, sugar, fat, alcohol, **caffeine**, meat, and dairy products. Organic foods are recommended to avoid exposure to pesticides and chemicals. Detoxification diets include plenty of high-fiber foods, including oat bran and **psyllium** seeds, to help cleanse the digestive tract. Apples, pears, and legumes are high in pectins, which are believed to have chelating effects on heavy metals. Foods high in **antioxidants** are recommended, such as fruits, vegetables, and fresh juices. Sulfur-containing foods such as **garlic**, onions, and eggs (organically produced) are utilized, as are dark-green leafy vegetables that contain high amounts of chlorophyll. Foods that may contain heavy metals are avoided, including many fish and shellfish. Factory-farmed chicken and eggs are avoided as well because chickens are often fed fish meal. There is some evidence that eating tofu may reduce lead levels in the blood. Tofu is rich in calcium, which may help reduce the blood's ability to absorb and retain lead.

Nutritional supplements include antioxidant vitamins A, C, and E, and multimineral supplements that contain calcium, iron, magnesium, copper, chromium, **selenium**, and zinc. Cysteine, **methionine**, L-glutathione, and DMSA (dimethyl succinate) are other supplements. Herbal support includes herbs that have detoxification effects, such as **milk thistle**, burdock, and numerous others. **Spirulina** and **chlorella** sea algae are used as well, and **acidophilus** helps rebuild the digestive tract.

Homeopathic remedies, which prompt the body's detoxification mechanisms, have shown success with heavy metal poisoning. Detoxification therapies are also highly recommended, including **fasting**, sweating, colonics, and therapeutic vomiting. **Ayurvedic medicine** has an intensive detoxification and healing program called **panchakarma**.

Allopathic treatment

In an emergency, patients should call 911 or a poison control hotline at (800) 222-1222. The treatment for most heavy metal poisoning is **chelation therapy**. A chelating agent specific to the metal involved is given orally, intramuscularly, or intravenously. The three most common chelating agents are edetate calcium disodium (CaEDTA), dimercaprol (BAL), and penicillamine. Succimer (DMSA) is used for children suffering from lead poisoning. The chelating agent encircles and binds to the metal in the body's tissues, forming a complex, which is then released from the tissue and travels in the bloodstream. The complex is filtered out of the blood by the kidneys and excreted in the urine. This process may be lengthy and painful and typically requires hospitalization. Chelation therapy is effective in treating lead, mercury, and arsenic poisoning, but it is not useful in treating **cadmium poisoning**. To date, no treatment has been proven effective for cadmium poisoning. In cases of acute mercury or arsenic ingestion, vomiting may be induced. Washing out the stomach (gastric lavage) may also be useful. The patient may also require treatment such as intravenous fluids for complications of poisoning such as shock, **anemia**, and kidney failure.

Expected results

The chelation process can only halt further effects of the poisoning; it cannot reverse neurological damage already sustained.

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KEY TERMS

Chelation—The process by which a molecule encircles and binds to a metal and removes it from tissue.

Heavy metals—Chemical elements that have a specific gravity (a measure of density) at least four times that of water, generally with harmful effects on the human body.

Prevention

Because exposure to heavy metals is often an occupational hazard, protective clothing and respirators should be provided and worn on the job. Protective clothing should then be left at the work site and not worn home, where it could transfer toxic dust to family members. Industries are urged to reduce or replace the heavy metals in their processes wherever possible. Exposure to environmental sources of lead, including lead-based paints, plumbing fixtures, vehicle exhaust, and contaminated soil, should be reduced or eliminated. In the late 2000s, the use of lead was banned in most applications in the United States, such as in leaded fuels and most types of paints.

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American Association of Poison Control Centers, 3201 New Mexico Ave., Suite 310, Washington, DC, 20016, (800) 222-1222, http://www.aapcc.org.

American Holistic Medical Association, One Eagle Valley Court, Suite 201, Broadview Heights, OH, 44147, (440) 838-1010, http://www.holisticmedicine.org.

Center for Occupational and Environmental Medicine, 7510 Northforest Dr., North Charleston, SC, 29420, (843) 572-1600, http://www.coem.com.

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Heel spurs

Definition

A heel spur is a bony projection on the sole (bottom) of the heel bone. This condition may accompany or result from severe cases of inflammation to the structure called *plantar fascia*. The plantar fascia is a fibrous band of connective tissue on the sole of the foot, extending from the heel to the toes.

Description

Heel spurs are a common foot problem resulting from excess bone growth on the heel bone. The bone growth is usually located on the underside of the heel bone, and may extend forward toward the toes. A painful tear in the plantar fascia between the toes and heel can produce a heel spur and/or inflammation of the plantar fascia. Because this condition is often correlated to a decrease in the arch of the foot, it is more prevalent after the ages of six to eight years, when the arch is fully developed.

Causes and symptoms

One frequent cause of injury to the plantar fascia is *pronation*. Pronation is defined as the inward and downward action of the foot that occurs while walking, so that the foot's arch flattens toward the ground (fallen arch). A condition known as excessive pronation creates a mechanical problem in the foot, and the portion of the plantar fascia attached to the heel bone can stretch and pull away from the bone. This can occur especially while walking and during athletic activities.

Some symptoms at the beginning of this condition include **pain** and swelling, and discomfort when pushing off with the toes during walking. This movement of the

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KEY TERMS

Genu valgus—Deformity in which the legs are curved inward so that the knees are close together, nearly or actually knocking as a person walks with ankles widely apart.

Plantar fascia—A tough fibrous band of tissue surrounding the muscles of the sole of the foot.

Plantar fascitis—Inflammation of the plantar fascia.

Pronation—The lowering or descending of the inner edge of the foot while walking.

foot stretches the fascia that is already irritated and inflamed. If this condition is not treated, pain will be noticed in the heel when a heel spur develops in response to the **stress**. This is a common condition among athletes and others who run and jump a significant amount.

An individual with the lower legs turning inward, a condition called *genu valgus* or "knock knees," can have a tendency toward excessive pronation. This can lead to a fallen arch and problems with the plantar fascia and heel spurs. Women tend to suffer from this condition more than men. Heel spurs can also result from an abnormally high arch.

Other factors leading to heel spurs include a sudden increase in daily activities, an increase in weight, or less cushion on the bottom of the heel due to old age. A significant increase in training intensity or duration may cause inflammation of the plantar fascia. High heel shoes, improperly fitted shoes, and shoes that are too flexible in the middle of the arch or bend before the toe joints will cause problems with the plantar fascia and possibly lead to heel spurs.

Bone spurs may cause sudden, severe pain when putting weight on the affected foot. Individuals may try to walk on their toes or ball of the foot to avoid painful pressure on the heel spur. This compensation during walking or running can cause additional problems in the ankle, knee, hip, or back.

Diagnosis

A thorough history and physical exam is always necessary for the proper diagnosis of heel spurs and other foot conditions. X rays of the heel area are helpful, as excess bone production will be visible.

Treatment

Acupuncture and **acupressure** can be used to address the pain of heel spurs, in addition to using friction massage to help break up scar tissue and delay onset of bony formations. Physical therapy may help relieve pain and improve movement. **Feldenkrais** method could be especially helpful for retraining some of the compensation movements caused by the pain from the spur. **Guided imagery** or a light massage on the foot may help to relieve some of the pain. Other treatments include low-gear cycling and pool running. Some chiropractors approve of moderate use of aspirin or ibuprofen, or other appropriate anti-inflammatory drugs. **Chiropractic** manipulation is not recommended, although chiropractors may offer custom-fitted shoe orthotics and other allopathic-type treatments outlined below.

Allopathic treatment

Heel spurs and plantar fascitis (inflammation of the plantar fascia) are usually controlled with conservative treatment. Early intervention includes stretching the calf muscles while avoiding reinjury to the plantar fascia. Decreasing or changing activities, losing excess weight, and improving the fit of shoes are all important measures to decrease foot pain. Modification of footwear includes well padded shoes with a raised heel and better arch support. Shoe inserts recommended by a healthcare professional are often very helpful when used with exercises to increase the strength of the foot muscles and arch. The inserts prevent excessive pronation and continued tearing of the plantar fascia.

To aid in the reduction of inflammation, applying ice for 10–15 minutes after activities and the use of anti-inflammatory medications, such as aspirin or ibuprofen, can be helpful. Corticosteroid injections may also be used to reduce pain and inflammation. Physical therapy can be beneficial with the use of heat modalities, such as ultrasound, that create a deep heat and reduce inflammation. If the pain caused by inflammation is constant, keeping the foot raised above the heart and/or compressed by wrapping with a bandage will help. Taping can help speed the healing process by protecting the fascia from reinjury, especially during stretching and walking.

In 2000, a number of U.S. podiatrists experimented with a new technology known as Extracorporeal Pressure Wave Treatment (EPWT). This technology is similar to lithotripsy, which uses sound waves to break up **kidney stones**. Cost of EPWT was roughly comparable to that of surgery. Initial reports from practitioners using the treatment were positive.

Heel surgery

When chronic heel pain fails to respond to conservative treatment, surgical treatment may be necessary.

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Heel surgery can provide pain relief and restore mobility. The type of procedure used is based on examination and usually consists of releasing the excessive tightness of the plantar fascia, called a plantar fascia release. The procedure may also include removal of heel spurs.

Expected results

Usually, heel spurs are curable with conservative treatment. If not, heel spurs are curable with surgery, although there is the possibility of them growing back. About 10% of those who continue to see a physician for plantar fascitis have it for more than a year. If there is limited success after approximately one year of conservative treatment, patients are often advised to have surgery.

Prevention

To prevent this condition, wearing properly fitted shoes with good arch support is very important. If a person is overweight, weight loss can help diminish stress on the feet and help prevent foot problems. For those who **exercise** frequently and intensely, proper stretching is always necessary, especially when there is an increase in activities or a change in running technique. It is not recommended to attempt to work through the pain, as this can change a mild case of heel spurs and plantar fascitis into a long-lasting and painful condition.

In 2002, researchers attempted to compare the effects of various running techniques on pronation and resulting injuries like stress **fractures** and heel spurs. They suggested that it is possible to teach runners to stride in such a way as to minimize impact forces. One way is to lower running speed. Another is to take longer rest periods following a run.

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David Helwig

Heliotrope *see* **Valerian**

Hellerwork

Definition

Hellerwork is a system of bodywork that combines deep tissue massage, body movement education, and verbal dialogue. It is designed to realign the body's structure for overall health, improvement of posture, and reduction of physical and mental **stress**.

Origins

Joseph Heller (1940–) developed Hellerwork, a system of structural integration patterned after **Rolfing**. Although Heller received a degree in engineering and worked for NASA's Jet Propulsion Laboratory in Pasadena, CA, he became interested in humanistic psychology in the 1970s. He spent two years studying bioenergetics and Gestalt therapy as well as studying under architect and futurist Buckminster Fuller (1895–1983), flotation tank therapy developer John Lilly, family therapist Virginia Satir, and body movement pioneer Judith Aston.

During this period, he trained for six years with Dr. Ida P. Rolf (1896-1979), the founder of Rolfing, and became a certified Rolfer in 1972. After Heller developed his own system of bodywork, he founded Hellerwork in 1979 and established a training facility in Mt. Shasta, California, where he continues his work.

Benefits

Hellerwork improves posture and brings the body's natural structure into proper balance and alignment. This realignment can bring relief from general aches and pains; improve breathing; and relieve physical and mental stress. Hellerwork has also been used to treat such specific physical problems as chronic back, neck, shoulder, and joint **pain** as well as repetitive stress injuries, including **carpal tunnel**

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KEY TERMS

Bioenergetics—A system of therapy that combines breathing and body exercises, psychological therapy, and the free expression of emotions to release blocked physical and psychic energy.

Bodywork—A term that covers a variety of therapies that include massage, realignment of the body, and similar techniques to treat deeply ingrained stresses and traumas carried in the tissues of the body.

Chronic—A disease or condition that progresses slowly but persists or reoccurs over time.

Fascia—The sheet of connective tissue that covers the body under the skin and envelops the muscles and various organs.

Gestalt therapy—A form of therapy that focuses on helping patients reconnect with their bodies and their feelings directly, as contrasted with verbal intellectual analysis.

Kinesiology—The study of the anatomy and physiology of body movement, particularly in relation to therapy.

Rolfing—A deep-tissue therapy that involves manipulating the body's fascia to realign and balance the body's structure.

syndrome. Hellerwork is also used to treat and prevent athletic injuries.

Description

Hellerwork is based largely on the principles of Rolfing, in which the body's connective tissue is manipulated or massaged to realign and balance the body's structure. Because Heller believes that physical realignment is insufficient, however, he expanded his system to include movement education and verbal dialogue as well as deep tissue massage.

Connective tissue massage

The **massage therapy** aspect of Hellerwork is designed to release the tension that exists in the deep connective tissue, called fascia, and return it to a normal alignment. The fascia is plastic and highly adaptable; it can tighten and harden in response to the general effects of gravity on the body, other ongoing physical stresses, negative attitudes and emotions, and periodic physical traumas. One example of ongoing physical stress is carrying a briefcase, which pulls down the shoulder on one side of the body. Over time, the connective tissue becomes hard and stiff; the body becomes adapted to that position even when the person is not carrying a briefcase. In trying to adjust to the uneven weight distribution, the rest of the body becomes unbalanced and out of proper alignment.

Heller believes that as people age, more of these stress and trauma patterns become ingrained in the connective tissue, further throwing the body out of alignment. As stress accumulates, the body shortens and stiffens, a process commonly attributed to **aging**. Hellerwork seeks to recondition the body and make the connective tissue less rigid.

Movement education

The second component of Hellerwork, movement education, trains patients in the proper physical movements needed to keep the body balanced and correctly aligned. Movement education focuses on common actions, such as sitting, standing, and walking. Hellerwork practitioners also teach better patterns of movement for activities that are specific to each individual, such as their job and favorite sports or social activities.

Verbal dialogue

Verbal dialogue is the third aspect of Hellerwork. It is designed to teach awareness of the relationships among emotions, life attitudes, and the body. Hellerwork practitioners believe that as patients become responsible for their attitudes, their body movements and patterns of self-expression improve. Dialogue focuses on the theme of each session and the area of the body that is worked on during that session.

Hellerwork consists of eleven 90-minute sessions costing about $90–100 each. The first three sessions focus on the surface layers of the fascia and on developmental issues of infancy and childhood. The next four sessions are the core sessions and work on the deep layers and on adolescent developmental issues. The final four treatments are the integrative sessions, and build upon all the previous ones, while also looking at questions of maturity.

Preparations

No advance preparations are required to begin Hellerwork treatment. The treatment is usually done on a massage table with the patient wearing only undergarments.

Precautions

Since Hellerwork involves vigorous deep tissue massage, it is often described as uncomfortable and

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sometimes painful, especially during the first several sessions. As it requires the use of hands, it may be a problem for people who do not like or are afraid of being touched. It is not recommended as a treatment for any disease or a chronic inflammatory condition such as arthritis, and can worsen such a condition. Anyone with a serious medical condition, including **heart disease**, diabetes, or respiratory problems, should consult a medical practitioner before undergoing Hellerwork.

Side effects

There are no reported serious side effects associated with Hellerwork when delivered by a certified practitioner to adults and juveniles.

Research and general acceptance

As most alternative or holistic treatments, there is little mainstream scientific research documenting the effectiveness of Hellerwork therapy. Since the deep tissue massage aspect of Hellerwork is similar to Rolfing, however, several scientific studies of Rolfing may be useful in evaluating Hellerwork. A 1988 study published in the *Journal of the American Physical Therapy Association* indicated that Rolfing stimulates the parasympathetic nervous system, which can help speed the recovery of damaged tissue. A 1997 article in *The Journal of Orthopaedic and Sports Physical Therapy* reported that Rolfing can provide effective and sustained pain relief from lower back problems.

Training and certification

Hellerwork practitioners are certified by Hellerwork and must complete 1,250 hours of training, including courses in anatomy, psychology, massage, and kinesiology.

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ORGANIZATIONS

Hellerwork. 406 Berry St. Mt. Shasta, CA 96067. (530) 926-2500. http://www.hellerwork.com.

Ken R. Wells

Hemorrhoids

Definition

Hemorrhoids, which are also called piles, is a condition of weakened and swollen veins in the anus or lower rectum. They often go unnoticed and usually clear up after a few days, but can also cause long-lasting discomfort of the rectum such as **pain**, **itching**, and bleeding. Hemorrhoids can be divided into two types: Internal hemorrhoids lie inside the anus or lower rectum; external hemorrhoids lie outside the anal opening. Both can be present at the same time. Sometimes a blood clot forms in an external hemorrhoid and inflammation and a painful lump develops. This condition is called a thrombosed hemorrhoid.

Description

Hemorrhoids are a very common medical complaint. More than 75% of Americans have hemorrhoids at some point in their lives, typically after age 30. Men are more likely than women to suffer from hemorrhoids that are serious enough to require professional treatment.

During a bowel movement, veins in the anus are protected from damage by expanding to drain blood away from the area. The veins are normally somewhat elastic, and they snap back to their regular size after defecation is finished. However, repeated straining due to **constipation** or hardened stools causes the veins to be swollen and stretched out of shape. The swelling also triggers nerves in the area, causing itchiness and a sensation of fullness in the bowel. In addition, straining may cause the rupture of blood vessels and bleeding at the anus.

Causes and symptoms

Aging, **obesity**, **pregnancy**, chronic constipation or chronic **diarrhea**, excessive use of enemas or laxatives, straining during bowel movements, and spending too much time on the toilet are all factors that can

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contribute to the development of hemorrhoids. In some people there is also a genetic tendency to have fragile veins that are prone to developing hemorrhoids and **varicose veins**.

The most common symptom of internal hemorrhoids is bright red blood in the toilet bowl or on one's feces or toilet paper. When hemorrhoids remain inside the anus they are almost never painful, but they can protrude outside the anus and become irritated and sore. Such hemorrhoids are called prolapsed hemorrhoids. These sometimes move back into the anal canal on their own or can be pushed back inside; however, they may remain permanently outside the anus until treated by a doctor. Small external hemorrhoids usually do not produce symptoms. Larger ones, however, can be painful and interfere with sitting, walking, defecating, and cleaning the anal area after a bowel movement.

Diagnosis

Diagnosis of hemorrhoids begins with a visual examination of the anus, followed by an internal manual examination. The doctor may also insert an anoscope, a small tube with a light that can be used to view the anal canal. More serious problems may be ruled out using a sigmoidoscope or colonoscope to inspect the colon.

Treatment

An herbal sitz bath using **witch hazel**, *Hamamelis virginiana*, may shrink hemorrhoids and ease discomfort. A strong infusion should be prepared by adding a gallon of boiling water to eight ounces of the dry herb, and then letting this mixture steep overnight. The infusion can be used several times as a 15-minute soak. Witch hazel can also be wiped directly over external hemorrhoids. In addition, an ointment formulated of **plantain**, *Plantago* spp. and **yarrow**, *Achillea millefolium*, will reportedly reduce pain and swelling.

Chinese herbal medicine may be formulated to treat Spleen Qi deficiency or heat in the lower burner. Hemp seeds are recommended for constipation. Daily helpings of foods that soften the stools and make them easier to pass is recommended by **traditional Chinese medicine** (TCM); examples of these include carrots, broccoli, dried persimmons and unripe figs. **Acupuncture** and **acupressure** are also recommended.

Homeopathy offers a gentle treatment solution for hemorrhoids. It is, therefore, especially appropriate for use during pregnancy. Suggested remedies include Aesculus hippocastanum 30c, Hamamelis virginiana 6c, and Calcarea fluorica 6c. Homeopathic and herbal rectal suppositories are available.

KEY TERMS

Anus—The opening at the lower end of the rectum. The anus and rectum are both part of the large intestine.

Constipation—Difficulty passing stools, infrequent stools, or insufficient stools.

Defecate—Pass feces through the anus for elimination.

Heat—In traditional Chinese medicine (TCM), a disease condition characterized by intolerance for cold, deficient fluids, and irritability, among other things.

Ligation—Tying off a blood vessels or other tube with wire or suture, usually during surgery.

Lower burner—A TCM term for the kidneys.

Prolapsed—Referring to an organ fallen down from its normal body position.

Qi—In TCM, the vital energy that is the foundation for all physical and mental activity.

Rectum—The lower section of the large intestine. After food has passed through the stomach and intestines and been digested, the leftover material, in the form of feces, enters the rectum, where it stays until defecation.

Sitz bath—A warm water bath, sometimes including medications or herbs, that is taken in the sitting position, with water covering only the hips and buttocks.

Spleen—In TCM, all the organs considered necessary for extracting and using nutrients.

Varicose veins—Swollen veins that can no longer maintain proper blood pressure.

Allopathic treatment

Hemorrhoids can often be effectively dealt with by dietary and lifestyle changes. Avoiding constipation is important, therefore adding fiber to the diet is recommended. Bulk laxatives and fiber supplements such as Metamucil or Citrucel may be suggested. After each bowel movement, wiping with a moistened tissue or pad sold for that purpose helps lessen irritation. A warm sitz bath for about 10 or 15 minutes two to four times a day can ease hemorrhoid pain. A cool compress or ice pack to reduce swelling is also recommended. Many people

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find temporary relief using over-the-counter hemorrhoid creams and foams. These products, however are not receommended during pregnancy.

When painful hemorrhoids do not respond to home-based remedies, professional medical treatment is necessary. Rubber band ligation is probably the most widely used of the many treatments for internal hemorrhoids. It is also the least costly for the patient. This procedure is performed on an outpatient basis. An applicator is used to place one or two small rubber bands around the base of the hemorrhoid, cutting off the blood supply. After 3 to 10 days in the bands, the hemorrhoid falls off, leaving a sore that heals in a week or two. Because internal hemorrhoids are located in a part of the anus that does not sense pain, anesthesia is unnecessary and the procedure is painless in most cases. The procedure may need to be repeated a few weeks later. After five years, 15–20% of patients experience a recurrence of internal hemorrhoids, but in most cases all that is needed is another banding.

External hemorrhoids, and some prolapsed internal hemorrhoids, are removed by conventional surgery in a hospital. Depending on the circumstances, this may require anesthesia. Full healing takes two to four weeks, but most people are able to resume normal activities at the end of a week. Hemorrhoids seldom return after surgery.

Expected results

Hemorrhoids are rarely life-threatening. Most clear up after a few days without medical treatment. However, because **colorectal cancer** and other digestive system diseases can cause anal bleeding and other hemorrhoid symptoms, people should always consult a healthcare practitioner when hemorrhoid symptoms occur.

Prevention

A **high-fiber diet**, daily **exercise**, and losing excess weight are recommended to maintain healthy digestion and elimination. To prevent hemorrhoids by strengthening the veins of the anus, rectum, and colon and increasing circulation, blackberries, blueberries, cherries and **vitamin C** are recommended. Tinctures of **butcher's broom** (*Ruscus aculeatus*, and **horse chestnut** (*Aesculus hippocastanum*), plant pigments (called flavonoids) found in fruit and fruit products, tea, and soy also are recommended. It should be noted that horse chestnut, along with commercial hemorrhoid preparations, is contraindicated during pregnancy.

Drinking water with a high-fiber meal or supplement will cause the stools to be softer and easier to pass, reducing straining. Constipation should be avoided, and good toilet habits should be cultivated. Promptly responding to the urge to defecate will help encourage regular bowel movements. Defecation should be done without rushing or straining. A squatting position over the toilet or having the feet raised on a small bench or footstool will also improve elimination. Reading, working or watching television are discouraged, because they entail prolonged sitting on the toilet, which increases the strain placed on anal and rectal veins. Perfumed soaps or toilet waters may irritate the anal area and should be avoided, as should excessive cleaning, rubbing, or wiping.

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Patience Paradox

Hepar sulphuris

Description

Hepar sulphuris is a homeopathic remedy that was created by Samuel Hahnemann, the father of **homeopathy**. Hahnemann combined the inner layer of oyster shells (*Calcium carbonica*) with flowers of **sulfur** and burned them to create *Hepar sulphuris calcareum*, or *Hepar sulph.* as it is commonly called. It is also known as **calcium** sulfide or Hahnemann's calcium sulfide. *Hepar* is the Latin word for liver, and as certain compounds of sulfur had the color of liver, the remedy was so named.

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Calcium sulfide was once used as a treatment for **mercury poisoning**, **gout**, **itching**, rheumatism, goiter, and swellings from **tuberculosis**. Now it is used in veterinary medicine, and in the manufacture of medicine, luminous paint, and hair removal products.

Although *Hepar sulph.* has the chemical properties of two other remedies, *Calcium carbonica* and sulfur, the actions of the remedies are different.

General use

Homeopaths prescribe *Hepar sulph.* for colds, coughs, sore throats, **croup**, abscesses, earaches, inflamed **cuts** and **wounds**, **asthma**, arthritis, **emphysema**, herpes, **constipation**, conjunctivitis, *Candida albicans* **infections**, **syphilis**, sinusitis, and skin infections.

The main indications for *Hepar sulph.* are as follows. The patient is overly sensitive to **pain**, touch, and cold. Pains are sharp, as if a splinter or piece of glass were being poked into the skin. A **sore throat** may feel like a fish bone is stuck in it and the pain increases upon swallowing. The slightest pressure causes much pain and the patient may faint from the pain. The patient cannot tolerate the cold and any exposure to cold air causes **chills**. If a hand or foot slips outside the bedcovers the patient will become chilled. Any slight exertion will cause the patient to perspire. The patient's sweat is cold and profuse and smells sour and offensive, like rotten cheese. Bodily discharges are yellow and thick and also smell offensive. If a **cough** is present, it is a dry, hacking cough with rattling of mucus in the chest.

The typical *Hepar sulph.* patients are delicate, oversensitive persons who tend to be scrawny in build and have enlarged glands. They are slow persons with flabby muscles, and often have light hair. They catch cold easily, dislike the cold, crave sour foods such as pickles and vinegar, and may dislike fats.

Mentally they are irritable, impulsive, angry, obstinate, anxious, fearful, impatient, sad, and depressed. They are very hard to get along with. Nothing pleases them and they dislike company. Often the desire to commit violence is present. They have poor memories. The *Hepar sulph.* patient is usually in a hurry—he drinks and eats fast and talks rapidly.

Hepar sulph. ailments generally arise from exposure to cold dry wind, suppression of perspiration and skin eruptions. Typical patients suffer from a lack of internal warmth, so all symptoms are made worse from exposure to cold conditions: cold air, cold weather, and cold wind. Fresh air, lying on the painful side, any pressure or touch, or being uncovered also aggravate the symptoms. Symptoms are worse in the morning and at night. Bed warmth and heat tend to make the symptoms better. The patient craves warmth and can often be found wrapped up in the bedcovers or wearing several layers of clothing.

Specific indications

The action of *Hepar sulph.* prevents the formation of pus and hastens healing of abscesses. In fact, *Hepar sulph.* is one of the best remedies for abscesses, but is useful only before the **abscess** is open. The *Hepar sulph.* abscess is swollen and painful, with needle-like pains.

Hepar sulph. colds are frequently brought on by exposure to cold, dry weather. A cold wind causes **sneezing** and a runny nose. At first the mucus is watery, then it becomes thick, yellow, and offensive smelling. The nose is swollen, red, and tender and the sense of smell may be lost. A hoarse voice, sore throat, and cough may develop. The patient may also be constipated.

The *Hepar sulph.* cough is of a dry, barking nature with thick, sticky, yellow mucus. The chest becomes sore from coughing. The cough is worse in the evening, and the patient may cough straight through to midnight or sometimes all night long. The patient may gag or choke while coughing. *Hepar sulph.* may be used in the treatment of croup when the symptoms for cough are exhibited. Croup coughs are generally worse in the morning, and the patient may have difficulty bringing up mucus.

The sore throat is accompanied by a splinter-like pain and swollen tonsils. The patient may feel as if there were a fish bone caught in the throat. The throat becomes worse from coughing or swallowing cold drinks.

Fevers are hot and often are accompanied by chills. A cold, sour sweat may be present, although it doesn't give any relief to the patient. If **diarrhea** is present, it is accompanied by a rumbling sensation in the abdomen.

Earaches with sharp, tearing pains may occur suddenly and be accompanied by abscesses in the ears. If the eardrum ruptures there may be a bloody, offensive discharge.

Eye irritations may indicate this remedy. The eyes are red and inflamed and may discharge a fluid. Toothaches are accompanied by bleeding gums and mouth abscesses.

Slow-to-heal cuts and wounds may be cured by *Hepar sulph.* The tissues surrounding the wound are inflamed and the pain is splinter-like.

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Pains in the finger, hip, and shoulder joints are caused by exposure to the cold and are of a sore, bruised nature.

Hepar sulph. has a positive effect on many skin problems such as **eczema**, **boils**, and herpes. The eczema is crusty, scabby, and oozing and generally appears in the bends of joints. Other eruptions may be moist, dry, itchy, and filled with pus. The boils are red, inflamed, and sore.

This remedy is often indicated in liver problems. Symptoms include stitching pains in the right side, a soreness that is aggravated by pressing on the area, sensitive **hemorrhoids**, and constipation.

A burning in the bladder or frequent urge to urinate may be present. The urine flows in a slow stream or in drops.

Preparations

Finely powdered oyster shell is mixed with flowers of sulfur and heated in an airtight container. The resulting white powder is dissolved in hot hydrochloric acid, mixed with milk sugar and diluted.

Hepar sulph. is available at health food and drug stores in various potencies in the form of tinctures, tablets, and pellets.

Precautions

If symptoms do not improve after the recommended time period, the patient should consult a homeopath or health-care practitioner. Do not exceed the recommended dose.

Side effects

There are no side effects, but individual aggravations may occur.

Interactions

When taking any homeopathic remedy, the patient should not use **peppermint** products, coffee, or alcohol. These products are known as antidotes in homeopathy. They counteract the homeopathic remedies.

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Jennifer Wurges

Hepatitis

Definition

Hepatitis is inflammation of the liver. Infectious or viral hepatitis is caused by a viral infection. The three most common forms of viral hepatitis recognized to cause liver disease are hepatitis A, hepatitis B, and hepatitis C (previously called hepatitis non-A, non-B). Other recognized types of hepatitis are hepatitis D, hepatitis E, and hepatitis G. A hepatitis F virus was reported in the 1990s, but its existence had not been confirmed as of the late 2000s.

Description

Hepatitis A

Hepatitis A is an inflammation of the liver caused by the hepatitis A virus (HAV). It is usually not very severe, generally starting within two to six weeks after contact with the virus and lasting no longer than two months.

Hepatitis A is commonly known as infectious hepatitis because it spreads relatively easily from those infected to close contacts. Once the infection ends, there is no lasting, chronic phase of illness. However, it is not uncommon to have a second episode or relapse of symptoms about a month after the first.

Epidemics of HAV infection can infect dozens and even hundreds of persons. Major outbreaks of hepatitis A have been linked to infected food handlers contaminating prepared foods. Many types of food also can be infected by sewage containing HAV, and shellfish is a common culprit.

Certain groups have an increased risk of contracting hepatitis A. These include:

- children and employees at daycare centers
- individuals living in crowded and/or unsanitary conditions
- sexually active individuals
- tourists visiting an area where hepatitis A is common

Hepatitis B

More than 300 million people throughout the world are infected by the hepatitis B virus (HBV). Hepatitis B occurs in both rapidly developing (acute) and long-lasting (chronic) forms and is one of the most frequent chronic infectious diseases worldwide. Commonly called serum hepatitis, hepatitis B ranges from mild to very severe. Some people who are infected by HBV develop no symptoms, but they may carry HBV

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in their blood and pass the infection on to others. In its chronic form, HBV infection may destroy the liver through a scarring process, called **cirrhosis**.

When a person is infected by HBV, the virus enters the bloodstream and body fluids and is able to pass through tiny breaks in the skin, mouth, or the genital area. This infection can occur during birth, when a mother with hepatitis B may pass HBV on to her infant. The virus also may be transmitted through contaminated needles and through unprotected sex with an HBV-infected individual. Casual contact cannot transmit hepatitis B.

Hepatitis C

Hepatitis C, or HCV, causes a rapidly developing, and often long-lasting disease. Spread mainly by contact with infected blood, HCV is the major cause of transfusion hepatitis, which can develop in patients who are given blood, although today, donated blood is regularly tested for hepatitis C. The existence of a third hepatitis virus (in addition to the A and B viruses) became clear in 1974, but HCV was first identified in 1989.

Hepatitis C is generally mild in its early, acute stage, but it is much more likely to produce chronic liver disease than hepatitis B. About two of every three persons who are infected by HCV may continue to have the virus in their blood and become carriers, who can transmit the infection to others.

The most common way of transmitting hepatitis C is when blood containing the virus enters another person's bloodstream through a break in the skin or the mucosa (inner lining) of the mouth or genitals. HCV may be passed from an infected mother to the infant she is carrying (however, the risk of infection from breast milk is very low). It also can be spread through sexual intercourse, especially if one partner is acutely infected at the time.

Hepatitis D

Hepatitis D (or delta) occurs only in patients who also are infected by the hepatitis B virus. Infection by the hepatitis delta virus (HDV) either occurs at the same time as hepatitis B or develops later when infection by HBV has entered the chronic stage.

Delta hepatitis can be quite severe, but it is seen only in patients already infected with HBV. In the late 1970s, Italian physicians discovered that some patients with hepatitis B had another type of infectious agent in their liver cells. Later the new virus, HDV, was confirmed by experimentally infecting chimpanzees. When both viruses are present, acute infection tends to be more serious. Furthermore, patients with both **infections** are more likely to develop chronic liver disease than those with HBV alone, and, when it occurs, it is more severe.

Hepatitis E

Hepatitis E also is known as epidemic non-A, non-B hepatitis. Like hepatitis A, it is an acute and short-lived illness that sometimes can cause liver failure. HEV, discovered in 1987, is spread by the fecal-oral route. It is present in countries where human waste has contaminated the drinking water supply. Large outbreaks (epidemics) have occurred in Asian and South American countries where there is poor sanitation. In the United States and Canada no outbreaks have been reported as of the late 2000s, but persons traveling to a region where it is present may return with HEV.

Hepatitis G

The hepatitis G virus was first described in early 1996. It has been designated as GBV-C by the International Commmittee on Taxonomy of Viruses. As of 2008, little was known about the frequency of GBV-C infection, the nature of the illness, or how to prevent it. What is known is that transfused blood containing GBV-C has caused some cases of hepatitis. For this reason, patients with hemophilia and other bleeding conditions who require large amounts of blood or blood products are at risk of hepatitis G. GBV-C has been identified in 1-2% of blood donors in the United States. Also at risk are patients with kidney disease who undergo hemodialysis treatments and those who use intravenous drugs. It is possible that an infected mother can pass on the virus to her newborn infant or that sexual transmission can occur.

Often patients with hepatitis G are infected at the same time by the hepatitis B or C virus, or both. In about three of every thousand patients with acute viral hepatitis, GBV-C is the only virus present. There is some indication that patients with hepatitis G may continue to carry the virus in their blood for many years, and so they might be a source of infection for others.

Causes and symptoms

Hepatitis A

The time between exposure to HAV and the onset of symptoms ranges from two to seven weeks and averages about one month. The virus is passed in the feces, especially late in the incubation period, before symptoms first appear. It can live for several hours on

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the skin surface and during this time may be transmitted to others. Infected persons are most contagious starting about a week before symptoms develop and remain contagious until the time **jaundice** (yellowing of the skin and/or eyes) is noted.

Often the first symptoms to appear are **fatigue**, muscle and joint aches, **nausea**, and a loss of appetite. Low grade **fever** is common, and the liver often enlarges, causing **pain** or tenderness in the right upper part of the abdomen. Jaundice then develops, typically lasting seven to ten days.

Hepatitis B

In the United States, a majority of acute HBV infections occur in teenagers and young adults. Half of these youth never develop symptoms, and only about 20% of infected patients develop severe symptoms and jaundice. The remaining 30% of patients have only flu-like symptoms and will probably not even be diagnosed as having hepatitis unless certain tests are done. Acute hepatitis B is characterized by loss of appetite, nausea, and pain or tenderness in the right upper part of the abdomen. Compared to patients with hepatitis A or C, those with HBV infection require more bed rest.

An HBV infection lasting longer than six months is said to be chronic. After this time it is much less likely for the infection to disappear. Not all carriers of the virus develop chronic liver disease; in fact, most have no symptoms. However, about one in every four HBV carriers develop cirrhosis. Patients are also likely to have an enlarged liver and spleen. The most serious complication of chronic HBV infection is liver **cancer**.

Hepatitis C

More than half of all patients who develop hepatitis C have no symptoms or signs of liver disease. Some, however, may have a minor illness with flu-like symptoms. About one in four patients with hepatitis C will develop jaundice, and some patients lose their appetite and frequently feel tired. Patients also may experience nausea.

In most patients, HCV can still be found in the blood six months after the start of acute infection, and these patients are considered carriers. If the virus persists for one year, it is unlikely to disappear completely. About 20% of chronic carriers develop cirrhosis (scarring) of the liver when the virus damages or destroys large numbers of liver cells, which are then replaced by scar tissue. Cirrhosis may develop only after a long period of time—as long as 20 years—has passed. Many patients will not develop cirrhosis and instead have a mild, chronic form of infection called chronic persistent hepatitis.

Hepatitis D

The delta virus is a small and incomplete viral particle. Perhaps this is why it cannot cause infection on its own. Its companion virus, HBV, actually forms a covering over the HDV particle. In chronically ill patients (those whose virus persists longer than six months), cirrhosis typically occurs.

When HBV and HDV infections develop at the same time—a condition called coinfection—recovery is the rule. Only 2–5% of patients become chronic carriers (the virus remains in their blood more than six months after infection). It may be that HDV actually keeps HBV from reproducing as rapidly as it would if it were alone, making chronic infection less likely.

When HBV infection occurs first and is followed by HDV infection, the condition is called superinfection. Between one-half and two-thirds of patients with superinfection develop severe acute hepatitis. Once the liver cells contain large numbers of HBV viruses, HDV tends to reproduce more actively. Massive infection and liver failure are more common in superinfection. The risk of liver cancer, however, is no greater than from hepatitis B alone.

As with other forms of hepatitis, the earliest symptoms are nausea, loss of appetite, joint pains, and fatigue. There may be fever and an enlarged liver may cause discomfort or pain in the right upper part of the abdomen. Jaundice may develop later.

Hepatitis E

There are at least two strains of HEV, one found in Asia and another in Mexico. The virus may start dividing in the gastrointestinal tract, but it grows mostly in the liver. After an incubation period of two to eight weeks, infected persons develop jaundice, fever, nausea, a loss of appetite, and discomfort or pain in the right upper part of the abdomen. Most often the illness is mild and disappears within a few weeks with no lasting effects.

Hepatitis E never becomes a chronic illness, but on rare occasions the acute illness damages and destroys so many liver cells that the liver can no longer function. This condition, called fulminant liver failure, may cause death. The great majority of patients who recover from acute infection do not continue to carry HEV and cannot pass the infection on to others. The most serious outbreaks of hepatitis E occurred in

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China (100,000 cases between 1986 and 1988) and India (79,000 cases in 1991).

Hepatitis G

Some researchers believe that there may be a group of GBV-C viruses, rather than just one. Others remain doubtful that GBV-C actually causes illness. If it does, the type of acute or chronic illness that results is not clear. When diagnosed, acute GBV-C infection has usually been mild and brief. There is no evidence of serious complications, but it is possible that, like other hepatitis viruses, GBV-C can cause severe liver damage, resulting in liver failure. The virus has been identified in as many as 20% of patients with long-lasting viral hepatitis, some of whom also have hepatitis C.

Diagnosis

A healthcare professional takes a thorough medical history and performs a physical examination of the patient when hepatitis is suspected. Blood tests for specific antigens and antibodies that are present in the different subtypes of hepatitis confirm the diagnosis, although these tests cannot detect all types of hepatitis. Liver function tests that measure enzyme levels may also be performed.

Treatment

Once symptoms appear, no antibiotics or other medicines will shorten the course of infectious hepatitis. Patients should rest in bed as needed, follow a healthy diet, and avoid drinking alcohol or taking any medications that could further damage the liver. Any medication that can cause liver damage should be avoided, and non-critical surgery should be postponed.

An herbalist or naturopathic healthcare professional may recommend a preparation of **milk thistle** (*Silybum marianum*) for the treatment of hepatitis. Milk thistle is thought to promote the growth of new liver cells and to prevent toxins from penetrating through healthy liver cells by binding itself to the cell membranes. It is frequently prescribed by herbalists for the treatment of cirrhosis, hepatitis, and other liver disorders. As of 2008, the National Center for Complementary and Alternative Medicine (NCCAM) reported that studies with laboratory animals suggested that milk thistle may have various benefits for the liver, although those studies did not examine the effects of the product specifically on hepatitis C. Studies on humans had, as of 2008, shown no beneficial effects of milk thistle on hepatitis C. The NCCAM also found mixed results for the use of **licorice** (*Glycyrriza glabra*), ginseng, and other herbal remedies in the treatment of hepatitis. In general, these products may show benefits in studies with cell cultures and experimental animals, although they have limited or no effects in the treatment of hepatitis in humans.

Vitamin C may be taken as a nutritional supplement, and it has been shown to help diminish acute hepatitis and help prevent hepatitis in hospitalized patients. Liver extracts are effective in liver regeneration and were used throughout the twentieth century. Thymus extracts enhance the immune system, which may help the body fight a hepatitis virus.

A practitioner of Chinese herbal medicine may recommend Fructus Schisandrae Chinensis, which improves liver function; Fructus Citrulli Vulgaris, which helps to expel jaundice; or other herbs for hepatitis symptoms.

Allopathic treatment

The U.S. Food and Drug Administration (FDA) has approved a class of genetically engineered products called recombinant alpha interferons for the treatment of hepatitis B and C. These drugs are sold under trade names such as Intron A, Roferon, Infergen, Pegasys, and Peg-Intron. They tend to lessen the symptoms of infection and improve liver function. Approximately half of all patients respond positively to the drugs, although only about 20% receive lasting effects. Fever and flu-like symptoms, fatigue and low energy levels, nausea, lack of appetite, **vomiting**, **diarrhea**, **depression**, and hair thinning (alopecia) are frequent side effects of the drugs. A variety of other antiviral medications, including telbivudine (Tyzeka), entecavir (Baraclude), lamivudine (Epivir-HBV), and adefovir dipivoxil (Hepsera) may also be effective in treating chronic HBV infection. Most cases of hepatitis A and acute hepatitis B are treated on an outpatient basis in which patients are encouraged to have as much bed rest as possible and remain hydrated by drinking as much liquid as possible. When hepatitis destroys most or all of the liver, the only hope may be a liver transplant. However, even when the procedure is successful, disease often recurs and cirrhosis may actually develop more rapidly than before.

Expected results

Hepatitis A

Most patients with acute hepatitis A, even when severe, begin feeling better in two to three weeks and recover completely in four to eight weeks. After recovering from hepatitis A, a person no longer carries the

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virus and remains immune for life. In the United States, serious complications are infrequent and deaths are rare. In the United States, as many as 75% of adults over the age of 50 have blood test evidence of previous hepatitis A.

Hepatitis B

Each year an estimated 150,000 persons in the United States get hepatitis B. More than 10,000 require hospital care, and as many as 5,000 die from complications of the infection. About 90% of those infected have only acute disease. A large majority of these patients recover within three months. It is the remaining 10%, with chronic infection, who account for most serious complications and deaths from HBV infection. In the United States, perhaps only 2% of all infected individuals become chronically ill. People infected with both HIV and hepatitis B are most likely to die than from either disease alone. Even when no symptoms of liver disease develop, chronic carriers remain a threat to others by serving as a source of infection.

Hepatitis C

In roughly one-fifth of patients who develop hepatitis C, the acute infection subsides, and they recover completely within four to eight weeks and have no later problems. Other patients face two risks: they themselves may develop chronic liver infection and possibly serious complications such as liver cancer, and they continue carrying the virus and may pass it on to others. The overall risk of developing cirrhosis is about 15% for all patients infected by HCV. Liver failure is less frequent in patients with chronic hepatitis C than it is for those with other forms of hepatitis. In those people who also have **AIDS**, hepatitis C infection increases the chance for liver cancer.

Hepatitis D

A large majority of patients with coinfection of HBV and HDV recover from an episode of acute hepatitis. However, about two-thirds of patients chronically infected by HDV go on to develop cirrhosis of the liver. If severe liver failure develops, the chance of a patient surviving is no better than 50%. A liver transplant may improve this figure to 70%.

Hepatitis E

In the United States hepatitis E is not a fatal illness, but elsewhere 1–2% of those infected die of advanced liver failure. In pregnant women the death rate is as high as 20%. It is not clear whether having hepatitis E once guarantees against future HEV infection.

KEY TERMS

Antibody—A substance made by the body in response to a foreign body, such as a virus, which is able to attack and destroy the invading body.

Antigen—Part of an invading microorganism, which causes tissue damage and which also stimulates the body's immune system to produce antibodies.

Cirrhosis—The end result of many forms of liver disease, the condition of the liver when its cells have been damaged or destroyed and are replaced by scar tissue.

Jaundice—Yellowing of the skin and whites of the eyes when pigments normally eliminated by the liver collect in high amounts in the blood.

Vaccine—A substance prepared from a weakened or killed virus which, when injected, helps the body to form antibodies that attack an invading virus and may prevent infection altogether.

Hepatitis G

What little is known about the course of hepatitis G suggests that illness is mild and does not last long. When more patients have been followed up after the acute phase, it will become clear whether GBV-C can cause severe liver damage.

Prevention

The best way to prevent any form of viral hepatitis is to avoid contact with blood and other body fluids of infected individuals. The use of condoms during sex is advisable. Travelers should avoid water and ice if unsure of their purity, or they can boil water before drinking it. All foods eaten should be packaged, well cooked, or, in the case of fresh fruit, peeled. Caution should be exercised when getting tattoos or body piercing, since a 2003 report stated that only about one-half of tattoo and piercing shops follow governmental guidelines concerning infection control. These practices can pass hepatitis and HIV infection.

Two vaccines are available for protection against hepatitis A and hepatitis B. The hepatitis A vaccine, distributed under the trade name Havrix, consists of inactivated HAV viruses. The hepatitis B vaccine, Engerix-B, is a recombinant (genetically modified) product containing a surface antigen of the HBV virus. Individuals in a high risk group and travelers should be vaccinated for hepatitis A, and much of the general population can be vaccinated for hepatitis B.

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ORGANIZATIONS

Hepatitis Foundation International, 504 Blick Dr., Silver Spring, MD, 20904, (800) 891-0707, http://www.hepfi.org/.

National Hepatitis C Coalition, PO Box 5058, Hemet, CA, 92544, (951) 766-8238, http://nationalhepatitis-c.org/.

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Herbalism, traditional Chinese

Definition

Chinese herbalism is one of the major components of **traditional Chinese medicine** (TCM), or Oriental medicine (OM). In TCM, herbs are often used in conjunction with other techniques, such as **acupuncture** or massage. Chinese herbalism is a holistic medical system, meaning that it looks at treating a patient as a whole person, looking at the mental and spiritual health, as well as the physical health, of the individual. Illness is seen as a disharmony or imbalance among these aspects of the individual. Chinese herbalism has been practiced for over 4,000 years.

One of the earliest and certainly the most important Chinese herbal text is the *Huang Ti Nei Ching*, or *Yellow Emperor's Classic of Internal Medicine*. It is believed to have been authored by Huang Ti during his reign over China, which started about 2697 B.C. Since that time, herbal practices have been more extensively documented and refined. In modern China, traditional Chinese herbalism is taught alongside conventional Western pharmacology. Chinese herbal remedies have been used in the West only relatively recently, over the past two decades. These remedies are more gentle and natural than conventional medicines. In addition, they have fewer unpleasant side effects. Individuals with chronic disorders in particular are increasingly drawn to the holistic aspect of Chinese herbalism and TCM in general.

Origins

Historical background

Traditional Chinese medicine originated in the region of eastern Asia that today includes China, Tibet, Vietnam, Korea, and Japan. Tribal shamans and holy men who lived as hermits in the mountains of China as early as 3500 B.C. practiced what was called the "Way of Long Life." This regimen included a diet based on herbs and other plants; kung-fu exercises; and special breathing techniques that were thought to improve vitality and life expectancy.

After the Han dynasty, the next great age of Chinese medicine was under the Tang emperors, who ruled from A.D. 608–906. The first Tang emperor established China's first medical school in A.D. 629. Under the Song (A.D. 960–1279) and Ming (A.D. 1368–1644) dynasties, new medical schools were established, their curricula and qualifying examinations were standardized, and the traditional herbal prescriptions

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KEY TERMS

Absorption spectrometry—A scientific procedure to determine the chemical composition of an unknown substance.

Interferon—A substance proved to be necessary in the body to help fight cancer cells.

Immune function—The body's defense system against bacteria, viruses and fungi, and any malfunction of the organism.

Pharmacodynamics—The study of the relationships and interactions of herbs.

Platelet aggregation—The clumping together of blood cells, possibly forming a clot.

Qi—The Chinese term for life force or vital energy.

Thrombocyte—Another name for platelet.

were written down and collected into encyclopedias. One important difference between the development of medicine in China and in the West is the greater interest in the West in surgical procedures and techniques.

Philosophical background: the cosmic and natural order

In Taoist thought, the Tao, or universal first principle, generated a duality of opposing principles that underlie all the patterns of nature. These principles, yin and yang, are mutually dependent as well as polar opposites. They are basic concepts in traditional Chinese medicine. Yin represents everything that is cold, moist, dim, passive, slow, heavy, and moving downward or inward; while yang represents heat, dryness, brightness, activity, rapidity, lightness, and upward or outward motion. Both forces are equally necessary in nature and in human well-being, and neither force can exist without the other. The dynamic interaction of these two principles is reflected in the cycles of the seasons, the human life cycle, and other natural phenomena. One objective of traditional Chinese medicine is to keep yin and yang in harmonious balance within a person.

In addition to yin and yang, Taoist teachers also believed that the Tao produced a third force, primordial energy or qi (also spelled chi or ki). The interplay between yin, yang, and qi gave rise to the Five Elements of water, metal, earth, wood, and fire. These entities are all reflected in the structure and functioning of the human body.

The human being

Traditional Chinese physicians did not learn about the structures of the human body from dissection because they thought that cutting open a body insulted the person's ancestors. Instead they built up an understanding of the location and functions of the major organs over centuries of observation, and then correlated them with the principles of yin, yang, qi, and the Five Elements. Thus wood is related to the liver (yin) and the gall bladder (yang); fire to the heart (yin) and the small intestine (yang); earth to the spleen (yin) and the stomach (yang); metal to the lungs (yin) and the large intestine (yang); and water to the kidneys (yin) and the bladder (yang). The Chinese also believed that the body contains Five Essential Substances, which include blood, spirit, vital essence (a principle of growth and development produced by the body from qi and blood), fluids (all body fluids other than blood, such as saliva, spinal fluid, sweat, etc.), and qi.

Benefits

Because it is a safe and inexpensive solution to health problems of all kinds, Chinese herbalism is very popular in China. In recent years, herbalism has been modernized with the introduction of quality control. For example, herbs are subjected to absorption spectrometry to determine levels of heavy metals found in some. Because they are standardized, Chinese herbs are safer for self-treatment. This approach puts the individual, not the physician, in charge of the individual's health; that is a basic goal of Chinese herbalism.

Chinese herbalism offers unique advice regarding what foods can help and what can hinder, and a herbalist can help an individual discover what he is allergic to. In addition, Chinese herbs stimulate the immune system and provide beneficial nutrients, aside from their role in curing illness.

At M.D. Anderson Hospital in Texas, medical research has confirmed that patients undergoing chemotherapy were shown to have an improved degree of immune function when they took the tonic herb **astragalus** (*huang qi*). (It is well known that chemotherapy suppresses the immune system.) Research also showed that T-cell and macrophage activity and interferon production was increased in patients using the Chinese herbs **ganoderma**, lentinus, and polyporus, helping the body fight **cancer** cells. Agents also found in ganoderma were found to inhibit platelet aggregation

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and thrombocyte formation, which would be helpful to counter circulation and heart problems.

An ingredient of ginseng was found to promote adrenal function, which would give the herb properties of enhancing many hormone functions in the body.

Description

Chinese herbal treatment differs from **Western herbalism** in several respects. In Chinese practice, several different herbs may be used, according to each plant's effect on the individual's Qi and the Five Elements. There are many formulas used within traditional Chinese medicine to treat certain common imbalance patterns. These formulas can be modified to fit specific individuals more closely.

A traditional Chinese herbal formula typically contains four classes of ingredients, arranged in a hierarchical order: a chief (the principal ingredient, chosen for the patient's specific illness); a deputy (to reinforce the chief's action or treat a coexisting condition); an assistant (to counteract side effects of the first two ingredients); and an envoy (to harmonize all the other ingredients and convey them to the parts of the body that they are to treat).

Methods of diagnosis

A Chinese herbalist will not prescribe a particular herb on the strength of symptoms only, but will take into consideration the physical condition, emotional health, and mental state of the patient. He or she may look at the condition of the patient's hair, skin, and tongue, as well as the appearance of the eyes, lips, and general complexion. The practitioner then listens to the sounds the body makes when breathing. He or she may smell the breath, **body odor**, or sputum in diagnosis.

TCM practitioners take an extensive medical history of a patient. He or she may ask about dietary habits, lifestyle, and sleep patterns. The patient will be questioned about chief medical complaints, as well as on his or her particular emotional state and sexual practices.

Chinese herbalists employ touch as a diagnostic tool. They may palpate the body or use light massage to assess the patient's physical health. Another chief component of Chinese medical diagnosis is **pulse diagnosis**, or sphygmology. This is a very refined art that takes practitioners years to master. Some practitioners can detect 12 different pulse points that correspond to the 12 major organs in Chinese medicine. There are over 30 pulse qualities that practitioners are able to detect on each point. The strength, speed, quality, and rhythm of the pulse, to name a few, will be determined before a diagnosis is given.

Herbs

Chinese herbs may be used alone or in combination. Relatively few are used alone for medicinal purposes. Practitioners believe that illness can be effectively treated by combining herbs based on their various characteristics and the patient's overall health. Every herb has four basic healing properties: nature, taste, affinity, and effect.

An herb's nature is described according to its yin or yang characteristics. Yang, or warming, herbs treat cold deficiencies. They are frequently used in the treatment of the upper respiratory tract, skin, or extremities. Yin, or cooling, herbs, treat hot excess conditions. They are most often used to treat internal conditions and problems with organs. Herbs can also be neutral in nature.

An herb's taste does not refer to its flavor, but to its effect on qi, blood, fluids, and phlegm. Sour herbs have a concentrating action. They are prescribed to treat bodily excess conditions, such as **diarrhea**, and concentrate qi. Bitter herbs have an eliminating or moving downward action. They are used to treat coughs, **constipation**, and heart problems. Sweet or bland herbs have a harmonizing action. They are used as restorative herbs and to treat **pain**. Spicy herbs have a stimulating action. They are prescribed to improve blood and qi circulation. Salty herbs have a softening action. They are used to treat constipation and other digestion problems.

An herb's affinity describes its action on a specific bodily Organ. (Note that Chinese medicine does not have the anatomical correlation for organ names. They correspond more closely to the organ's function.) Sour herbs have an affinity for the Liver and Gallbladder. Bitter herbs act on the Heart and Small Intestine. Sweet and bland herbs affect the Stomach and Spleen. Spicy herbs have an affinity for Lungs and Large Intestine, whereas salty herbs act on the Kidneys and Bladder.

Chinese herbs are lastly classified according to their specific actions, which are divided into four effects. Herbs that dispel are used to treat an accumulation, sluggishness, or spasm by relaxing or redistributing. Herbs with an astringent action are used to consolidate or restrain a condition characterized by discharge or excessive elimination. Herbs that purge treat an obstruction or "poison" by encouraging elimination and **detoxification**. Tonifying herbs nourish, support, and calm where there is a deficiency.

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Treatment of diabetes

The incidence of diabetes has increased quite dramatically in recent years, especially in the United States, where in general people take less **exercise**, and food is taken in greater quantity with a general reduction in quality. This increase has led to a scramble to find new solutions to the problem, and many researchers have focused their interest on Chinese herbal remedies. In the search for more effective and more convenient treatments, the alkaloid berberine has come under close scrutiny for its many uses, among them the treatment of diabetes. In trials, rats given a mixture of berberine and alloxan showed less likelihood of incurring a rise in blood sugar. Patients suffering from type II diabetes who were given between 300 and 600 mg of berberine daily for between one and three months, showed a reduction in blood sugar levels, when taken in conjunction with a controlled diet.

Treatment of AIDS and cancer

Independent researchers are investigating indications that Chinese herbalism can reduce the toxicity of chemotherapy and other medications, in addition to stimulating immune responses.

Treatment of diarrhea associated with cholera

A team of researchers in Japan has found that some traditional Chinese herbal formulations inhibit the toxin produced by *Vibrio cholerae*, the microorganism that causes cholera. These preparations appear to be helpful when given in addition to oral rehydration treatment for diarrhea associated with cholera.

Treatment of atopic dermatitis

Some physicians have found Chinese herbal remedies useful in relieving the symptoms of atopic **dermatitis**, a chronic disorder of the skin that is difficult to treat. Herbal remedies have the advantage of relieving the **itching** and inflammation associated with atopic dermatitis without the long-term toxic side effects of conventional medications.

Preparations

Those who are unfamiliar with Chinese herbs and their uses should consult a practitioner before starting any treatment. Once a remedy is prescribed, it may be purchased at Oriental markets or health food stores. Most Chinese remedies prepared for Western markets are standardized and sold in ready-to-use formulations, with instructions for dosage. A Chinese herbalist may prescribe herbs to be made into tea, or taken as capsules.

Precautions

It is best to avoid Chinese herbs that are not sold in a standardized form. Herbs can vary considerably in potency, depending on the time and place of their harvesting. In addition, cases have been reported in Europe as well as the United States of dried Chinese herbs contaminated by sewage or other forms of pollution.

When treating a patient, the herbalist will aim to gently "nudge" the system into shape, rather than producing any immediate reaction. A return to health, therefore, may take time, and it is important that the patient realizes the principles underlying the treatment. Some practitioners estimate that treatment will take a month for every year that a chronic condition has existed. The advantage of the slow pace is that if there is a bad reaction to any herb, which is rare, it will be mild because the treatment itself is gentle.

As with most naturopathic therapies, Chinese herbal remedies work best when taken in conjunction with a healthy lifestyle and program of exercise.

Side effects

Some Chinese herbs are incompatible with certain prescription drugs or foods. Others should not be taken during **pregnancy**. Because of possible interactions, persons who are interested in taking traditional Chinese herbal remedies should not try to diagnose or treat themselves with these preparations.

Recent studies indicate that some herbs used in Chinese medicines may cause liver damage. Women appear to be more susceptible to such reactions than men. Damage to the liver may range from minor problems involving higher levels of certain enzymes called transaminases, to chronic **hepatitis**, **cirrhosis**, and acute liver failure requiring transplantation. Because of these risks, persons considering Chinese herbal treatments should consult a medical doctor before going to the herbalist. It is essential for patients to inform their doctors about all medications or preparations they are taking, including alternative and over-the-counter remedies as well as prescription drugs.

Research and general acceptance

At present, there is renewed interest in the West in traditional Chinese medicine and Chinese herbalism. Of the 700 herbal remedies used by traditional Chinese practitioners, over 100 have been tested and found effective by the standards of Western science. Several United States agencies, including the National Institutes of Health, the Office of Alternative Medicine,

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and the Food and Drug Administration are currently investigating Chinese herbal medicine as well as acupuncture and *Tui na* massage. In general, however, Western studies of Chinese medicine focus on the effects of traditional treatments and the reasons for those effects, thus attempting to fit traditional Chinese medicine within the Western framework of precise physical measurements and scientific hypotheses.

Training and certification

Practitioners of Oriental medicine can obtain certification in Chinese herbalism through the National Commission for the Certification of Acupuncture and Oriental Medicine, (NCCAOM). Some states have adopted the NCCAOM examination as all or part of their criteria for licensing. In California, the standards are higher, and these qualifications are not accepted. The licensing titles given by states varies, but herbalists are required to be a doctor of oriental medicine (OMD or DOMO). In 1990, the U.S. Secretary of Education recognized the National Accreditation Commission for Schools and Colleges of Acupuncture and Oriental Medicine as an accrediting agency.

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The California Association of Acupuncture and Oriental Medicine. http://www.CAAOM.ORG/medicine/overview.htm

For help with herbs and a list of practitioners: http://www.craneherb.com/.

Institute of Chinese Materia Medica, China Academy of Traditional Chinese Medicine. Beijing, 100700.

Patricia Skinner
Rebecca J. Frey, PhD

Herbal cold remedies

Definition

Herbal cold remedies are over-the-counter medications that contain herbs in their formulas, sometimes along with vitamins and minerals.

Description

Colds have been around for centuries; yet as of 2008, there was no cure for a cold or a vaccine to prevent them. However, walk into any pharmacy or chain supermarket and there is almost certain to be an entire section devoted to over-the-counter (OTC) products that claim to treat or prevent colds. Many of these are herbal formulas or individual herbs. OTC **cough** and cold medications accounted for nearly $3 billion in sales in the United States in 2007. Homeopathic cold remedies, many of which are herbal, account for more than $100 million in annual sales and are growing each year.

Herbal cold remedies took on an increased significance when in January 2008, the U.S. Food and Drug Administration (FDA) banned the use of OTC cold medications in children under the age of 2, and was considering raising the age limit to 5 and younger. The FDA also said it would issue recommendations on OTC cold products for children 12 and younger, which was expected in late 2008. In enacting the ban, the FDA said there was no scientific evidence that OTC cold products provided any relief to infants and that they may actually be harmful, citing reports of increased heart rates, unconsciousness, convulsions, and even death associated with their use. The ban prompted drug makers to discontinue all cold medications with the word "infant" or pictures of babies on their packaging. There were about 800 children's cold products marketed in the United States and dozens were affected by the ban. The ban specifically targeted cold products for children that contain one or more of certain types of drugs, including decongestants, expectorants, antihistamines, and antitussives. Several months before the ban, a number of drug makers voluntarily withdrew products from the market, including such brand names as Dimetapp, Little Colds, Pediacare, Robitussin, Triaminic, and Tylenol.

More than 200 different viruses are known to cause the symptoms of the **common cold**. Some, such as the rhinoviruses, seldom produce serious illnesses. Others, such as parainfluenza and respiratory syncytial virus, produce mild **infections** in adults but can cause severe lower respiratory infections in young

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children. The causes of 30 to 50% of adult colds, presumed to be viral, remain unidentified as of 2008. Although the common cold is usually mild, with symptoms lasting one to two weeks, it is a leading cause of doctor visits and of school and job absenteeism, according to the National Institute of Allergy and Infectious Diseases (NIAID). Colds are most prevalent among children, and seem to be related to youngsters' relative lack of resistance to infection and to contacts with other children in day-care centers and schools. Children have about six to ten colds a year. In families with children in school, the number of colds per child can be as high as 12 a year. Adults average about two to four colds a year, although the range varies widely. Women, especially those aged 20 to 30 years, have more colds than men, possibly because of their closer contact with children. On average, individuals older than 60 have fewer than one cold a year, according to the NIAID.

Among the most popular herbal/homeopathic cold remedy formulas are Zicam, Airborne, and Cold-Eeze. Airborne received a huge boost in 2004 when it was featured on Oprah Winfrey's television talk show. Airborne is an effervescent (like an Alka-Seltzer tablet) dietary supplement that was allegedly created by a school teacher as an immune system booster to help ward off colds. Airborne claims to contain 17 ingredients, including seven herbal extracts, **antioxidants**, electrolytes, and **amino acids**. It costs $7 to $8 for a tube of 10 tablets. One critic of Airborne is Mark Crislip, a specialist in internal medicine and infectious disease and an outspoken skeptic of alternative and complementary medicine. In a very carefully worded article in the March 2007 issue of *Pediatrics for Parents*, Crislip questions the legitimacy and effectiveness of Airborne. He lists seven warning signs that indicate a product, such as Airborne, is "not worth your hard-earned money." One is when a product is advertised directly to the public and not through the medical community. He notes that Airborne is not subject to FDA regulation and has not been proven in clinical studies to be safe or effective. He also wrote that Airborne makes conflicting statements about its product's ability to boost the immune system and reduce the duration of cold symptoms. He claims that Airborne's ingredients—with the exception of zinc—do nothing to treat or prevent a cold. He also questions the legitimacy of a cold remedy created by a school teacher rather than a physician or scientist.

Another Airborne critic is James Steckelberg, an infectious disease specialist at the Mayo Clinic. In an April 19, 2007, article on the Mayo Clinic Web site (http://www.mayoclinic.com), Steckelberg wrote: "there's no conclusive evidence that this product (Airborne) or any of its ingredients prevent colds or shorten their duration." Both Zicam and Airborne state that they have clinical studies that show the products are safe and effective. However, critics note that the studies were paid for by Zicam and Airborne and that their safety and effectiveness have not been determined by the FDA. Cold-Eeze, Zicam, and Airborne can be marketed as homeopathic remedies simply because they contain small amounts of **zinc**, which has been shown in some clinical trials to reduce cold symptoms. However, other clinical trials have concluded that zinc showed no benefit in reducing cold symptoms, according to a 2008 report from researchers at the Mayo Clinic.

General use

Most herbal cold remedies were not affected by the FDA ban. There are dozens of herbs that are used in herbal cold formulas. Among them are **andrographis**, ashwa ghanda, ginseng, **echinacea**, eleuthero, **astragalus**, cat's claw, **garlic**, fo-ti, black cumin, **green tea**, ligustrum, **maitake**, **noni**, white cedar, wild indigo, and black elderberry. Herbal cold remedies treat single or multiple cold symptoms, such as coughing, **fever**, nasal congestion, **sore throat**, **headache**, and **sneezing**.

Preparations

The most popular herb to prevent and treat cold and flu is echinacea, which has been shown in some studies to bolster the immune system. It has been used for centuries by Native Americans for a variety of health conditions. A number of studies reported it is effective in treating and preventing colds. Garlic and onions both have antiviral chemicals and have been used to counteract the effects of colds. Cinnamon is another natural cold remedy that has been used for centuries to treat colds, flu, and sinus conditions. Another herbal cold remedy, **ginger**, has a dozen antiviral compounds and is a powerful digestive herb. Ginger root is a plant native to southeast Asia and is also grown in the United States and other countries. It fights colds by relieving congestion and soothing sinus **pain** and sore throats. Herbal cold remedies also include inhaling the steam from **chamomile**, **thyme**, or **eucalyptus** teas, which are known to loosen mucus and help soothe the throat, nasal passages, and bronchial tubes. Many herbal formulas also contain **vitamin C** and zinc.

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Recommended dosage

There are few, if any, standard dosing recommendations for herbs and herbal cold formulas. However, some general dosing guidelines for several of the most popular herbs are as follows:

- Echinacea—As a powdered extract, take at least 2,000 milligrams (mg) a day in three doses; as a liquid, take three to four milliliters (ml) three times daily.
- Andrographis—A common dose is an extract of 400 mg three times a day. Some alternative medicine practitioners recommend it be used with eleutherococcus, a Chinese herb.
- Black elderberry—As an extract or in capsules, take 15 ml four times a day for five days to treat a cold.
- Maitake—An extract from the maitake mushroom, the suggested dose is 1,800 mg once a day as a treatment and preventative.
- Black cumin—An extract, the usual dosage is 50 to 75 mg once a day as a preventative and three times a day as a treatment.
- Chamomile, thyme, and eucalyptus—Steep one to two teaspoons in hot or boiling water for three to five minutes. Inhale the steam for 15 minutes three times a day in the acute stage of a cold and in the evening before bed in the end stage of a cold to help the bronchial passages heal.

Precautions

The primary precautions are that not all herbal cold remedies contain the ingredients that are listed on the package, that they contain ingredients not listed, or they do not contain the dosage listed on the package or insert. In 2007, the non-profit consumer research group ConsumerLab.com (http://www.consumerlab.com) tested 66 herbal cold remedy products and found that only 44% contained the correct dosages and four were contaminated with lead, a toxic substance that in high amounts can cause serious illness and even death. Only one of six echinacea products tested had the correct ingredients and one had lead. Only six of 14 cold prevention products with garlic had the correct ingredients and two had lead contamination. Of the 13 ginseng cold remedies tested, only seven contained the correct ingredients and two contained lead. Recommendations by ConsumerLab.com for people purchasing herbal cold remedies are:

- Cold remedies with echinacea—Look for products that contain at least 1% of phenols and at least 2,000 mg of echinacea and as a treatment, use for one to two weeks.

KEY TERMS

Antihistamine—A drug that blocks the action of histamine (a substance that produces an allergic reaction) and is used to control allergies.

Antitussive—A drug that is used to control coughing.

Decongestant—A drug that relieves nasal congestion.

Expectorant—A medicine that stimulates the production of mucus and is used to treat coughing.

Over-the-counter (OTC)—A medication that does not require a doctor's prescription.

- Cold remedies with garlic—Buy products that contain at least 3,600 micrograms (mcg) of allicin (garlic extract) per day. Garlic does not treat cold symptoms, but as a preventative, it reduces the number of colds by 66% if used regularly.
- Cold remedies with ginseng—Use products with at least 1.5 to 2% total ginsenosides (3 to 4% for extracts). Take 400 mg per day regularly to reduce the number of colds during the winter.

Side effects

Most herbs and herbal formulas have no adverse side effects when taken in normal or usual doses. People with concerns should check with their doctor or pharmacist before taking any herbal cold remedy.

Interactions

Interactions are rare but can occur. Products containing garlic should not be used with blood thinners. Ginseng can affect blood glucose (sugar) levels. It is best to check with a doctor or pharmacist for possible interactions between herbs or between herbs and other OTC or prescription medications the patient is taking.

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American Herbal Products Association, 8484 Georgia Ave., Suite 370, Silver Spring, MD, 20910, (301) 588-1171, http://www.ahpa.org.

American Institute of Homeopathy, 801 N. Fairfax St., Suite 306, Alexandria, VA, 22314, (888) 445-9988, http://www.homeopathyusa.org.

Australian Traditional Medicine Society, PO Box 1027, Meadowbank, NSW 2114, Australia, 61 2 9809 6800, http://www.atms.com.au.

Canadian Association of Naturopathic Doctors, 1255 Sheppard Ave. East, Toronto, ON, M2K 1E3, Canada, (800) 551-4381, http://www.cand.ca.

Office of Dietary Supplements, National Institutes of Health, 6100 Executive Blvd., Room 3B01, MSC 7517, Bethesda, MD, 20892, (301) 435-2920, http://www.ods.od.nih.gov.

Ken R. Wells

Herbalism, Western

Definition

Western herbalism is a form of the healing arts that draws from herbal traditions of Europe and the Americas, and that emphasizes the study and use of European and Native American herbs in the treatment and prevention of illness. Western herbalism is based on physicians' and herbalists' clinical experience and traditional knowledge of medicinal plant remedies preserved by oral tradition and in written records over thousands of years. Western herbalism, like the much older system of **traditional Chinese medicine**, relies on the synergistic and curative properties of the plant to treat symptoms and disease and maintain health.

Western herbalism is based upon pharmocognosy, the study of natural products. Pharmocognosy includes the identification, extraction methods, and applications of specific plant constituents responsible for specific therapeutic actions, such as the use of digoxin from **Digitalis** leaf for heart failure. These constituents are extracted, purified and studied in clinical research. They may be concentrated to deliver standardized, set doses. Sometimes, the natural constituent can be synthesized in the lab, or changed and patented. Practitioners may choose to use fresh medicinal plants, simple extracts, or standardized extracts.

In standardized extracts, a specific quantity of a constituent is called a marker compound, and it may or may not be the active constituent(s) in the plant medicine. The products should be produced under good manufacturing processes and according to the traditional *National Formulary U. S. Dispensatory* or *U. S. Pharmacopeia*.

Origins

Over 2,500 years ago Hippocrates wrote, "In medicine one must pay attention not to plausible theorizing but to experience and reason together." This Greek physician and herbalist from the fourth century B.C. is considered the father of western medicine. He stressed the importance of diet, water quality, climate, and social environment in the development of disease. Hippocrates believed in treating the whole person, rather than merely isolating and treating symptoms. He recognized the innate capacity of the body to heal itself, and emphasized the importance of keen observation in the medical practice. He recommended simple herbal remedies to assist the body in restoring health.

Ancient Greek medicine around the fifth century B.C. was a fertile ground for contrasting philosophies and religions. Greek physicians were influenced by the accumulated medical knowledge from Egypt, Persia, and Babylon. Medical advances flourished and practitioners and scholars were free to study and practice without religious and secular constraints. In the fourth century B.C., Theophrastus wrote the *Historia Plantarum*, considered to be the founding text in the science of botany.

During the first century A.D. Dioscorides, a Greek physician who traveled with the Roman legions, produced five medical texts. His herbal text, known as the *De Materia Medica* is considered to be among the most influential of all western herbal texts. It became a standard reference for practitioners for the next

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KEY TERMS

Phyto-, as in phytochemical, phytomedicinal, and phytotherapy—Meaning, or pertaining to, a plant or plants.

Wildcrafting—Gathering of herbs or other natural materials.

1,500 years. This influential book also included information on medicinal herbs and treatments that had been used for centuries in Indian **Ayurvedic medicine**. Galen of Pergamum, who also lived in the first century A.D., was a Roman physician and student of anatomy and physiology. He authored a recipe book containing 130 antidotes and medicinal preparations. These elaborate mixtures, known as galenicals, sometimes included up to 100 herbs and other substances. This complex approach to herbal medicine was a dramatic change from the simple remedies recommended by Hippocrates and employed by traditional folk healers. Galen developed a rigid system of medicine in which the physician, with his specialized knowledge of complex medical formulas, was considered the ultimate authority in matters of health care. The Galenic system, relying on theory and scholarship rather than observation, persisted throughout the Middle Ages. The galenical compounds, along with bloodletting, and purging, were among the drastic techniques practiced by the medical professionals during those times; however, traditional herbal healers persisted outside the mainstream medical system.

During the eighth century a medical school was established in Salerno, Italy, where the herbal knowledge accumulated by Arab physicians was preserved. The Arabian Muslims conducted extensive research on medicinal herbs found in Europe, Persia, India, and the Far East. Arab businessmen opened the first herbal pharmacies early in the ninth century. The *Leech Book of Bald*, the work of a Christian monk, was compiled in the tenth century. It preserved important medical writings that had survived from the work of physicians in ancient Greece and Rome.

The Middle Ages in Europe were a time of widespread death by plagues and pestilence. The Black Plague of 1348, particularly, and other health catastrophes in later years, claimed so many lives that survivors began to lose faith in the dominant Galenic medical system. Fortunately, the knowledge of traditional herbal medicine had not been lost. Medieval monks who cultivated extensive medicinal gardens on the monastery grounds, also patiently copied the ancient herbal and medical texts. Folk medicine as practiced in Europe by traditional healers persisted, even though many women herbalists were persecuted as witches and enemies of the Catholic Church and their herbal arts were suppressed.

The growing spice trade and explorations to the New World introduced exotic plants, and a whole new realm of botanical medicines became available to Europeans. Following the invention of the printing press in the fifteenth century, a large number of herbal texts, also simply called herbals, became available for popular use. Among them were the beautifully illustrated works of the German botanists Otto Brunfels and Leonhard Fuchs published in 1530, and the Dutch herbal of Belgian physician Rembert Dodoens, a popular work that was later reproduced in English. In 1597, the physician and gardener John Gerard published one of the most famous of the English herbals, still in print today. Gerard's herbal, known as *The Herball or General Historie of Plantes* was not an original work. Much of the content was taken from the translated text of his Belgian predecessor Dodoens. Gerard did, however, include descriptions of some of the more than one thousand species of rare and exotic plants and English flora from his own garden.

The correspondence of astrology with herbs was taught by Arab physicians who regarded astrology as a science helpful in the selection of medicines and in the treatment of diseases. This approach to Western herbalism was particularly evident in the herbal texts published in the sixteenth and seventeenth centuries. One of the most popular and controversial English herbals is *The English Physician Enlarged* published in 1653. The author, Nicholas Culpeper, was an apothecary by trade. He also published a translation of the Latin language *London Pharmacopoeia* into English. Culpeper was a nonconformist in loyalist England, and was determined to make medical knowledge more accessible to the apothecaries, the tradesmen who prescribed most of the herbal remedies. Culpeper's herbal was criticized by the medical establishment for its mix of magic and astrology with **botanical medicine**, but it became one of the most popular compendia of botanical medicine of its day. Culpeper also accepted the so-called "Doctrine of Signatures," practiced by medieval monks in their medicinal gardens. This theory teaches that the appearance of plants is the clue to their curative powers. Plants were chosen for treatment of particular medical conditions based on their associations with the four natural elements and with a planet or sign. The place where the plant grows, its dominant physical feature, and the

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smell and taste of an herb determined the plant's signature. Culpeper's herbal is still in print in facsimile copies, and some pharmocognosists and herbalists in the twenty-first century voice the same criticisms that Culpeper's early critics did.

European colonists brought their herbal knowledge and plant specimens to settlements in North America where they learned from the indigenous Americans how to make use of numerous nutritive and medicinal plants, native to the New World. Many European medicinal plants escaped cultivation from the early settlements and have become naturalized throughout North America. The first record of Native American herbalism is found in the manuscript of the native Mexican Indian physician, Juan Badianus published in 1552. The American Folk tradition of herbalism developed as a blend of traditional European medicine and Native American herbalism. The pioneer necessity for self-reliance contributed to the perseverance of folk medicine well into the twentieth century.

In Europe in the seventeenth century, the alchemist Paracelsus changed the direction of Western medicine with the introduction of chemical and mineral medicines. He was the son of a Swiss chemist and physician. Paracelsus began to apply chemicals, such as arsenic, mercury, **sulfur**, **iron**, and **copper** sulfate to treat disease. His chemical approach to the treatment of disease was a forerunner to the reliance in the twentieth century on chemical medicine as the orthodox treatment prescribed in mainstream medical practice.

The nineteenth and twentieth centuries brought a renewed interest in the practice of Wwestern herbalism and the development of natural therapies and health care systems that ran counter to the mainstream methods of combating disease symptoms with synthetic pharmaceuticals.

In the late eighteenth century, the German physician Samuel Hahnemann developed a system of medicine known as **homeopathy**. This approach to healing embraces the philosophy of "like cures like."homeopathy uses extremely diluted solutions of herbs, animal products, and chemicals that are believed to hold a "trace memory" or energetic imprint of the substance used. Homeopathic remedies are used to amplify the patient's symptoms with remedies that would act to produce the same symptom in a healthy person. Homeopathy holds that the symptoms of illness are evidence of the body's natural process of healing and eliminating the cause of the disease.

In 1895, the European medical system known as naturopathy was introduced to North America. Like homeopathy, this medical approach is based on the Hippocratic idea of eliminating disease by assisting the body's natural healing abilities. The naturopath uses nontoxic methods to assist the body's natural healing processes, including nutritional supplements, herbal remedies, proper diet, and **exercise** to restore health.

Western herbalism is regaining popularity at a time when the world faces the **stress** of overpopulation and development that threatens the natural biodiversity necessary for these valuable medicinal plants to survive. The American herb market is growing rapidly and increasing numbers of individuals are choosing alternative therapies over mainstream allopathic Western medicine.

Though research into the efficacy and safety of traditional herbal remedies is increasing, it has been limited by the high costs of clinical studies and laboratory research, and by the fact that whole plants and their constituents are not generally patentable (therefore, there is no drug profit after market introduction). Outside the United States, herbalism has successfully combined with conventional medicine, and in some countries is fully integrated into the nations' health care systems. At the beginning of the twenty-first century, 80% of the world's population continues to rely on herbal treatments. The World Health Organization promotes traditional herbal medicine for treatment of many local health problems, particularly in the Third World where it is affordable and already well integrated into the cultural fabric.

In the United States, the re-emergence in interest in holistic approaches to health care is evident. Citizens are demanding access to effective, safe, low-cost, natural medicine. Legislative and societal change is needed, however, before natural therapies can be fully integrated into the allopathic health care system and provide citizens with a wide range of choices for treatment. If the current trend continues, U. S. citizens will benefit from a choice among a variety of safe and effective medical treatments.

Benefits

The benefits of botanical medicine may be subtle or dramatic, depending on the remedy used and the symptom or problem being addressed. Herbal remedies usually have a much slower effect than pharmaceutical drugs. Some herbal remedies have a cumulative effect and work slowly over time to restore balance, and

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others are indicated for short-term treatment of acute symptoms. When compared to pharmaceutical drugs, herbal remedies prepared from the whole plant have relatively few side effects. This is due to the complex chemistry and synergistic action of the full range of phytochemicals present in the whole plant, and the relatively lower concentrations. They are generally safe when used in properly designated therapeutic dosages, and less costly than the isolated chemicals or synthetic prescription drugs available from Western pharmaceutical corporations.

Description

Herbs are generally defined as any plant or plant part that may be used for medicinal, nutritional, culinary, or other beneficial purposes. The active constituents of plants (if known) may be found in varying amounts in the root, stem, leaf, flower, and fruit, etc. of the plant. Herbs may be classified into many different categories. Some Western herbalists categorize herbal remedies according to their strength, action, and characteristics. Categories may include sedatives, stimulants, laxatives, febrifuges (to reduce **fever**), and many others. One system of classification is based on a principle in traditional Chinese medicine that categorizes herbs into four classes: tonics, specifics, heroics, or cleansers and protectors. Within these broad classifications are the numerous medicinal actions of the whole herb which may be due to a specific chemical or combination of chemicals in the plant.

- Tonics. Herbs in this classification are also known as alteratives in Western herbalism. They are generally mild in their action and act slowly in the body, providing gentle stimulation and nutrition to specific organs and systems. Tonic herbs act over time to strengthen and nourish the whole body. These herbs are generally safe and may be used regularly, even in large quantities. These tonic herbs are known as "superior" remedies in traditional Chinese medicine. The therapeutic dose of tonic remedies is far removed from the possible toxic dose. American ginseng is an example of a tonic herb.
- Specifics. Herbs in this classification are strong and specific in their therapeutic action. They are generally used for short periods of time in smaller dosages to treat acute conditions. Herbs classified as specifics are not used beyond the therapeutic treatment period. Echinacea is a specific herb.
- Heroic. These herbs offer high potency but are potentially toxic, and should not be used in self-treatment. Because the therapeutic dosage may be close to the lethal dosage, these herbs are presented cautiously and closely monitored or avoided by trained clinicians. They should not be used continuously or without expert supervision. Poke (*Phytolacca americana*) is an example of a heroic remedy.
- Cleansers and protectors. These herbs, plants, and plant tissues remove wastes and pollutants, while minimally affecting regular body processes. An example of a cleanser is pectin. Pectins are the water-soluble substances that bind cell walls in plant tissues, and some believe that they help remove heavy metals and environmental toxins from the body.

Preparations

Herbal preparations are commercially available in a variety of forms including tablets or capsules, tinctures, teas, fluid extracts, douches, washes, suppositories, dried herbs, and many other forms. The medicinal properties of herbs are extracted from the fresh or dried plant parts by the use of solvents appropriate to the particular herb. Alcohol, oil, water, vinegar, glycerin, and propylene glycol are some of the solvents used to extract and concentrate the medicinal properties. Steam distillation and cold-pressing techniques are used to extract the **essential oils**. The quality of any herbal remedy and the potency of the phytochemicals found in the herb depends greatly on the conditions of weather and soil where the herb was grown, the timing and care in harvesting, and the manner of preparation and storage.

Precautions

Herbal remedies prepared by infusion, decoction, or alcohol tincture from the appropriate plant part, such as the leaf, root, or flower are generally safe when ingested in properly designated therapeutic dosages. However, many herbs have specific contraindications for use when certain medical conditions are present. Not all herbal remedies may be safely administered to infants or small children. Many herbs are not safe for use by pregnant or lactating women. Some herbs are toxic, even deadly, in large amounts, and there is little research on the chronic toxicity that may result from prolonged use. Herbal remedies are sold in the United States as dietary supplements and are not regulated for content or efficacy. Self-diagnosis and treatment with botanical medicinals may be risky. A consultation with a clinical herbalist, Naturopathic physician, or certified clinical herbalist is prudent before undertaking a course of treatment.

Essential oils are highly concentrated and should not be ingested as a general rule. They should also be diluted in water or in a non-toxic carrier oil before application to the skin to prevent **contact dermatitis**

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or photo-sensitization. The toxicity of the concentrated essential oil varies depending on the chemical constituents of the herb.

The American Professor of Pharmacognosy, Varro E. Tyler, believes that "herbal chaos" prevails in the United States with regard to herbs and phytomedicinals. In part he blames the herb producers and marketers of crude herbs and remedies for what he terms unproven hyperbole, poor quality control, deceptive labeling, resistance to standardization of dosage forms, and continued sale of herbs determined to be harmful.

A new warning about Western herbalism has been made necessary by technology. The Internet has a number of sites available with unregulated and often unhealthy advice about use of herbal remedies. Many herbalists and allopathic physicians urge patients to use caution when seeking Internet information on herbal treatments. One cancer-related study found that only 36% of the web sites found in a search offered information that complied with regulatory guidelines about unsubstantiated claims about treatment or cure of disease.

Side effects

Herbs contain a variety of complex phytochemicals that act on the body as a whole or on specific organs and systems. Some of these chemical constituents are mild and safe, even in large doses. Other herbs contain chemicals that act more strongly and may be toxic in large doses or when taken continuously. Drug interactions are possible with certain herbs when combined with certain pharmaceutical drugs. Some herbs are tonic in a small amount and toxic in larger dosages.

In 2002, a report to the American Academy of Pediatrics cautioned members to watch for signs of adverse effects to the cardiovascular system of children from certain herbal remedies that are often not revealed by their families. For example, **ephedra** causes increases in heart rate and blood pressure. Other examples of child and adolescent patients with heart complications from herbs given to them that their parents assumed would be harmless were given by the presenter. Another report said that even adult patients fail to inform their physicians about herbal products they are using, and that patients do not think of them as medicines. Yet many herbal products can interact with allopathic medicines and either cancel their effects or cause adverse effects. For example, **garlic**, ginseng, ginkgo, **feverfew**, **licorice**, and other common remedies have anticoagulant properties that can put patients as risk of bleeding during surgery.

Research and general acceptance

Western herbalism is experiencing a revival of popular and professional interest. The number of training schools and qualified herbal practitioners is growing to meet the demand. Western herbalism is incorporated into the medical practice of licensed Naturopathic doctors, who receive special training in clinical herbalism. Folk herbalists, heir to the continuing oral traditions passed from generation to generation in many rural areas, as well as amateur, self-taught herbalists, keep the practice of botanical medicine alive at the grassroots level. Traditional Western herbalism relies on traditional use and materia medica, folk wisdom, and recent clinical research and advances in the extraction processes. These advances provide increased quality control on the concentration and potency of the active ingredients. Western physicians, educated in allopathic medicine, typically receive no training in the use of herbs. These doctors rely on pharmaceutical drugs for their patients, and some cite the following reasons for continuing to do so: lack of standardized dosages, lack of quality control in the preparation of herbal medicinals, and the dearth of clinical research verifying the safety and effectiveness of many traditional herbal remedies.

Herbalism is widely practiced throughout Europe, particularly in England, France, Italy, and Germany where phytomedicinals are available in prescription form and as over-the-counter remedies. In Germany, plant medicines are regulated by a special government body known as the Commission E. In the United States, however, despite increasing popularity, traditional herbalism is not integrated into the allopathic medical system. Phytomedicinals are sold as dietary supplements rather than being adequately researched and recognized as safe and effective drugs. The Dietary Supplement Health and Education Act of 1994 circumvented a U. S. Food and Drug Administration (FDA) effort to effectively remove botanicals from the marketplace and implement regulations restricting sale. Massive popular outcry against the proposed regulations on the sale of herbs and phytomedicinals resulted in this Congressional action. In 2000, U.S. President Bill Clinton, by executive order, created the White House Commission on Alternative Medicine in an effort to hold alternative medicine therapies "to the same standard of scientific rigor as more traditional health care interventions." That Commission is charged with recommending federal guidelines and legislation regarding the use of alternative medical therapies in the twenty-first century.

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Training and certification

In the United States, courses of study in Western herbalism are available in almost all 50 states. The study of traditional herbalism is part of the course curriculum in Naturopathic medical colleges that offer four-year degree programs leading to licensure as a Doctor of Naturopathy. The oldest of these institutions is the National College of **Naturopathic Medicine**, established in 1956. Western clinical herbalism is taught through a growing number of institutions and organizations offering training and certification through residential and apprenticeship programs, and by correspondence. Some programs are comprehensive, with curricula in physiology, clinical diagnosis and treatment, ethnobotany, pharmacognosy, phytotherapy, plant identification, ethical wildcrafting and cultivation, and preparation and application of herbal remedies. Other programs are brief, geared more to the amateur herbalist and gardener. The Southwest School of Botanical Medicine in Bisbee, Arizona, is one of the oldest herbal schools, established in 1978. No licensing body yet exists in the United States to regulate the practice of herbal medicine.

In the United States herbal remedies are sold as dietary supplements. They are not regulated as to content and efficacy, and few are prepared in standardized dosages. Many of the supplements commercially available base claims for efficacy on traditional use and anecdotal evidence that has not been duplicated by clinical studies. In Germany, Commission E evaluates the safety and efficacy of the 300 herbs and herb combinations sold in that country. No equivalent regulatory commission exists in the United States. Permits are required in some states for the wildcrafting of rare and endangered herbs, such as **goldenseal** and **American ginseng**, two commercially valuable herbs in high demand in the growing medical botanicals industry.

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Clare Hanrahan
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Herniated disk

Definition

Disk herniation is a breakdown of a fibrous cartilage material (annulus fibrosus) that makes up the intervertebral disk. The annulus fibrosus surrounds a soft gel-like substance in the center of the disk called the nucleus pulposus. Pressure from the vertebra above and below may cause the nucleus pulposus to be forced against the sides of the annulus. The constant pressure of the nucleus against the sides of the annulus will cause the fibers of the annulus to break down. As the fibers of the annulus breakdown, the nucleus will push toward

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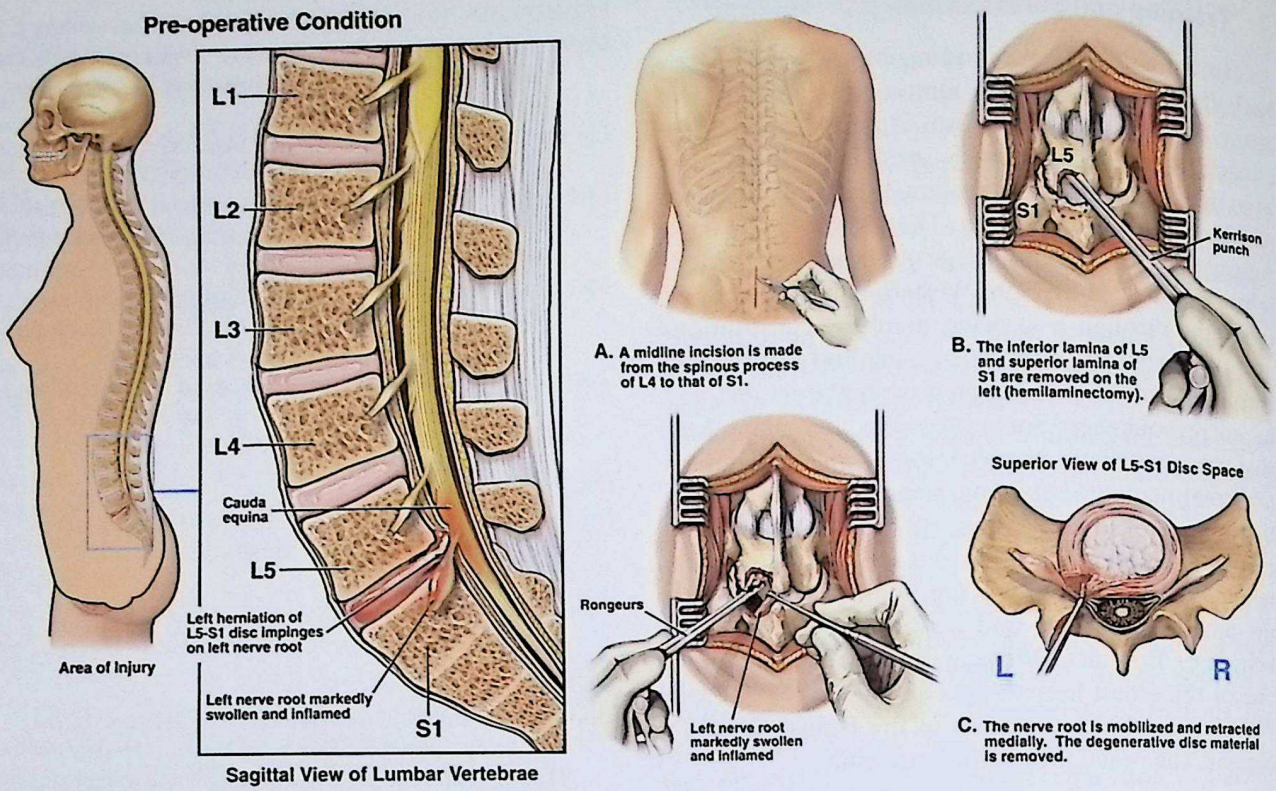

Back surgery, Disk Herniation with Hemilaminectomy and Discectomy. *(© Nucleus Medical Art, Inc. / Alamy)*

the outside of the annulus and cause the disk to bulge in the direction of the pressure. This condition most frequently occurs in the lumbar region and is also commonly called a herniated nucleus pulposus, prolapsed disk, ruptured disk, or a slipped disk.

Description

The spinal column is made up of 24 vertebrae that are joined together and permit forward and backward bending, side bending, and rotation of the spine. There are seven cervical (neck), twelve thoracic (chest region), and five lumbar (low back) vertebrae. There are intervertebral disks between each of the 24 vertebrae as well as a disk between the lowest lumbar vertebrae and the large bone at the base of the spine called the sacrum.

Disk herniation most commonly affects the lumbar region. However, disk herniation can also occur in the cervical spine. The incidence of cervical disk herniation is most common between the fifth and sixth cervical vertebrae. The second most common area for cervical disk herniation occurs between the sixth and seventh cervical vertebrae. Disk herniation is uncommon in the thoracic region.

The peak age for occurrence of disk herniation is between 20 and 45 years of age. Studies have shown that males are more commonly affected than females in lumbar disk herniation by a 3:2 ratio. Long periods of sitting or a bent-forward work posture may lead to an increased incidence of disk herniation.

There are four classifications of disk pathology:

- A protrusion occurs when a disk bulges without rupturing the annulus fibrosus.
- A prolapse occurs when the nucleus pulposus pushes to the outermost fibers of the annulus fibrosus but does not break through them.
- An extrusion occurs when the outermost layer of the annulus fibrosus is torn and the material of the nucleus moves into the epidural space.
- A sequestration occurs when fragments from the annulus fibrosus or the nucleus pulposus have broken free and are outside the confines of the disk.

Causes and symptoms

Any direct or forcefulpressure on the disks in a vertical directioncan cause the disk to push its nucleus into the fibers of the annulus or into the intervertebral canal. A herniated disk may occur suddenly from lifting, twisting, or direct injury, but more often it will occur from constant compressive loads over time. There may be a single incident that causes symptoms

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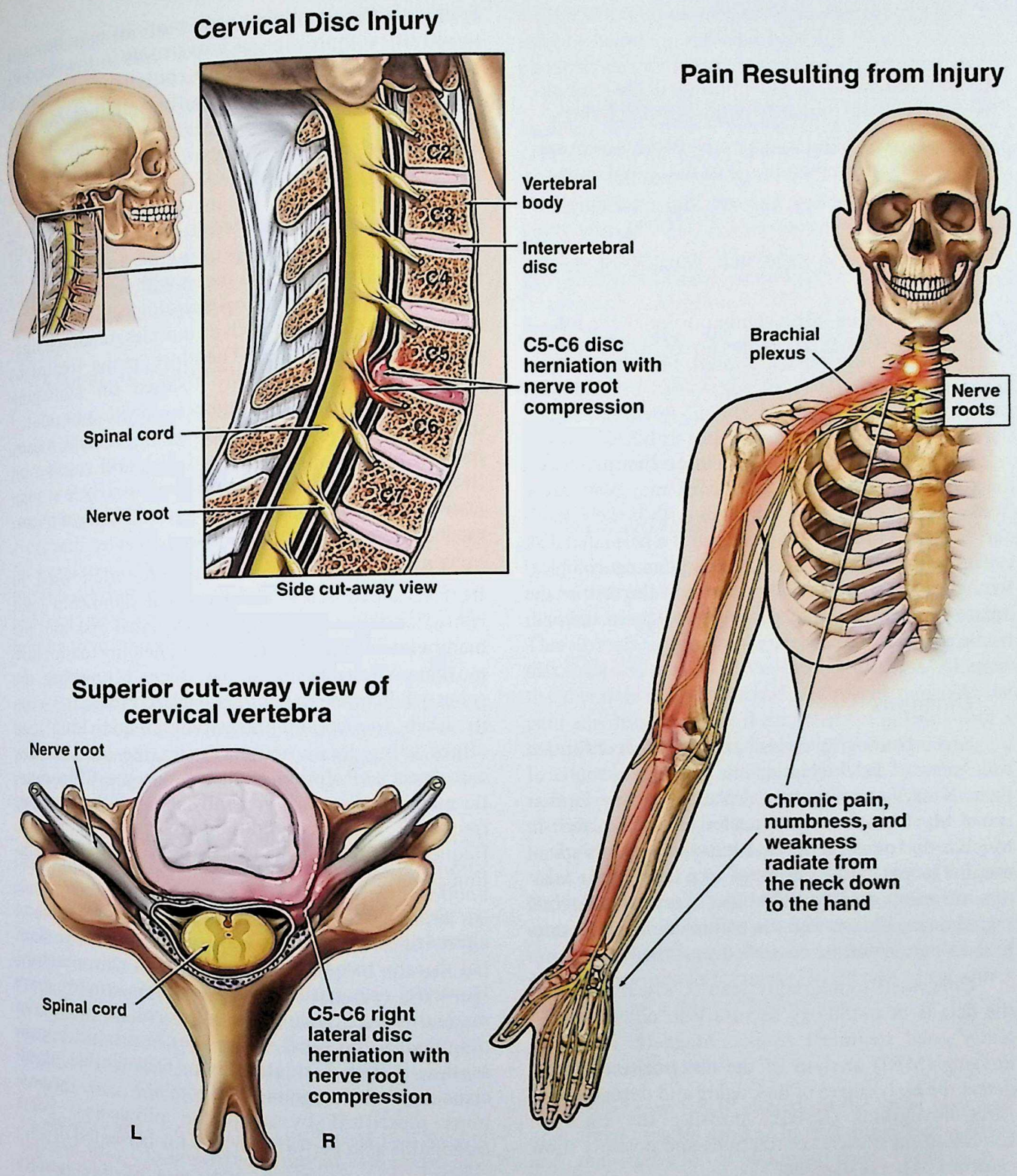

Herniated disk. *(© Nucleus Medical Art, Inc. / Alamy)*

to be felt, but very often the disk was already damaged and bulging prior to any one particular incident.

Depending on the location of the herniation, the herniated material can also press directly on nerve roots or on the spinal cord. Pressure on the nerve roots or spinal cord may cause a shock-like **pain** sensation down the arms if the herniation is in the cervical vertebrae or down the legs if the herniation is in the lumbar region.

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KEY TERMS

Annulus fibrosis—The outer portion of the intervertebral disk made primarily of fibrocartilage rings.

Epidural space—The space immediately surrounding the outer most membrane of the spinal cord.

Excision—The process of excising, removing, or amputating.

Fibrocartilage—Cartilage that consists of dense fibers.

Nucleus pulposus—The center portion of the intervertebral disk that is made up of a gelatinous substance.

In the lumbar region a herniation that presses on the nerve roots or the spinal cord may also cause weakness, numbness, or problems with bowels, bladder, or sexual function. It is unclear if a herniated disk causes pain by itself without pressing on neurological structures. It is likely that irritation of the disk or the adjacent nerve roots may cause muscle spasm and pain in the region of the disk pathology.

Diagnosis

Several radiographic tests are useful for confirming a diagnosis of disk herniation and locating the source of pain. X rays show structural changes of the lumbar spine. Myelography is a special x ray of the spine in which a dye or air is injected into the patient's spinal canal. The patient lies strapped to a table as the table tilts in various directions and spot x rays are taken. X rays showing a narrowed dye column in the intervertebral disk area indicate possible disk herniation.

Computed tomography scan (CT scans) exhibit the details of pathology necessary to obtain consistently good treatment results. Magnetic resonance imaging (MRI) analysis of the disks can accurately detect the early stages of disk **aging** and degeneration. Electromyograms (EMGs) measure the electrical activity of the muscle contractions and possibly show evidence of nerve damage.

A number of physical examination procedures may be used to determine if a herniated disk is pressing on a nerve root. While these tests may not identify the definitive presence of a herniated disk, they are very useful for indicating if there is pressure on a nerve root from some structure such as a herniated disk. The straight leg raise test may be used to identify pressure on nerve roots in the lumbar region while the Spurling's test (involving neck motion) may be used to identify compression of nerve roots in the cervical region. Compression of nerve roots in the cervical, thoracic, or lumbar regions may be apparent with the slump test.

Treatment

It is unclear if herniated disks cause pain themselves, or if they must be pressing on a nerve root to cause pain. Pain may also occur with herniated disks as a result of mechanical or neurological irritation of surrounding structures such as muscles, tendons, ligaments, or joint capsules. Therefore, many treatment strategies will be primarily focused on managing symptoms that occur in conjunction with a herniated disk. Unless a serious neurological problem exists, most symptoms of a herniated disk will resolve on their own. Yet, the interventions listed below may greatly speed the time required to resolve symptoms associated with a herniated disk.

Chiropractic manipulations are often used to treat herniated disks. There is often significant joint restriction that accompanies a herniated disk and the manipulative therapy is effective at helping to mobilize movement restrictions in the spine. Mobilizing the spine will help the patient get back to moderate activity levels sooner and the earlier an individual can return to moderate activity levels, the quicker they can expect a resolution of their symptoms. Chiropractic manipulations are generally done with a greater frequency when a condition is in an acute stage. The frequency of treatments will be reduced as the condition progresses.

Osteopathic therapy, considered by some to be an alternative treatment, may use manipulations or manual therapy techniques very similar to chiropractors. However, osteopathic physicians often employ more manual therapy techniques that focus on the role of the muscles and other soft tissues in producing pain sensations with herniated disks. Osteopathic physicians may also recommend use of the same medications prescribed by allopathic physicians. Some osteopaths also perform surgery for herniated disks.

Acupuncture involves the use of fine needles inserted along the pathway of the pain to move energy through the body and relieve the pain. Neurological irritation is considered to be a frequent source of pain with a herniated disk. Many believe acupuncture is particularly effective for pain management and addressing this neurological irritation. Acupuncture can also help break the cycle of pain and muscle spasm that often accompanies a herniated disk.

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Massage therapists focus on muscular reactions to the herniated disk. Neurological irritation that comes with a herniated disk will often cause excessive **muscle spasms** in the lower back muscles. These spasms will perpetuate dysfunctional movements in the joints of the spine and may exaggerate compressive forces on the intervertebral disk. By relaxing the muscles, massage therapists will attempt to manage the symptoms of disk herniation until proper movement can be restored. Proper movement and avoidance of aggravating postures, like sitting for long periods, will often be a great help in completely resolving the symptoms.

Allopathic treatment

Unless serious neurologic symptoms occur, herniated disks can initially be treated with pain medication. Pain medications, including anti-inflammatories, muscle relaxers, or in severe cases, narcotics, may be used if needed. Bed rest is sometimes prescribed. However, bed rest is frequently discouraged as a treatment for herniated disks unless movement is severely painful. It has become apparent that prolonged periods of bed rest may aggravate symptoms, slow down the healing time, and cause other complications.

Epidural steroid injections have been used to decrease pain by injecting an anti-inflammatory drug, usually a corticosteroid, around the nerve root to reduce inflammation and **edema** (swelling). This partly relieves the pressure on the nerve root as well as resolves the inflammation.

Physical therapists are skilled in treating acute back pain caused by disk herniation. The physical therapist can provide noninvasive therapies, such as ultrasound or **diathermy** to project heat deep into the tissues of the back or administer manual therapy, if mobility of the spine is impaired. They may help improve posture and develop an **exercise** program for recovery and long-term protection. Traction can be used to try to decrease pressure on the disk. A lumbar support can be helpful for a herniated disk at this level as a temporary measure to reduce pain and improve posture.

Surgery may be used for conditions that do not improve with conservative treatment. There are several surgical approaches to treating a herniated disk. A number of surgical procedures may be used to remove a portion of the intervertebral disk that may be pressing on a nerve root. When a portion of the disk is removed through a surgical procedure it is called a discectomy. Sometimes a spinal fusion will be performed after disk material has been removed. In this process a portion of bone is taken from the pelvis and placed between the bodies of the vertebrae. A spinal fusion will limit motion at that vertebral segment, but may be helpful in the event that significant disk material has been removed.

Chemonucleolysis is an alternative to surgical removal of the disk. Chymopapain, a purified enzyme derived from the papaya plant, is injected into the disk space to reduce the size of the herniated disks. The reduction in size of the disk relieves pressure on the nerve root. In 2002, Tokyo doctors produced evidence that a growth factor called vascular endothelial growth factor (VEGF) could speed up the process of injured disk resorption.

In September 2002, a noted orthopedic and spine authority named John Engelhardt became the first American to receive an artificial disk replacement (using the Bristol disk) in an operation in Switzerland. The artificial disk technology was still in clinical trials in the United States.

Expected results

Only a small percentage of patients with unrelenting neurological involvement, leading to chronic pain of the spine, need to have a surgical procedure performed. This strongly suggests that many patients with herniated disks respond well to conservative treatment. Alternative therapies can play a significant role in managing the pain and discomfort for the majority of patients with a herniated disk. In fact, magnetic resonance imaging (MRI) studies of the lumbar spine have indicated that many people without any back pain at all have herniated disks. This means it is unclear what role the herniated disk plays in many back pain cases. For many of these patients, proper symptom management of pain and improvement in joint motion and mobility through manual therapies will be enough to fully resolve their symptoms. For those patients who do require surgery, options are available for newer, less invasive procedures that will allow a quicker healing time.

Prevention

Proper exercises to strengthen the lower back and abdominal muscles are key in preventing excess **stress** and compressive forces on lumbar disks. Good posture will help prevent problems on cervical, thoracic, and lumbar disks. A good flexibility program is critical for prevention of muscle spasm that can cause an increase in compressive forces on disks at any level. Proper lifting of heavy objects is important for all muscles and levels of the individual disks. Good posture in sitting, standing, and lying down is helpful for the spine. Losing weight, if needed, can prevent weakness and unnecessary stress on the disks caused by **obesity**.

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Alternative treatments such as chiropractic, **massage therapy**, or acupuncture may play a very important role in prevention of herniated disk problems. Regular use of these approaches may help maintain proper muscular tone and reduce the cumulative effects of postural strain that may lead to the development of disk problems.

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Herpes genitalis *see* **Genital herpes**
Herpes simplex *see* **Canker sores; Cold sores**
Herpes zoster *see* **Shingles**

Hesperidin

Definition

Hespiridin is a citrus flavonoid found primarily in orange, lemon, and grapefruit peel.

Description

Flavonoids, also called **bioflavonoids**, are a type of antioxidant found primarily in fruits, vegetables, and other plant-based foods, including teas and wines. More than 5,000 individual flavonoids have been identified in plants, and several hundreds are known to occur in frequently consumed foods. Flavonoids are the most common subgroup of polyphenol phytochemicals, or natural bioactive compounds in plant-based foods that have a variety of health maintenance and disease-fighting properties.

Because of the antioxidant properties of flavonoids, these phytochemicals are thought to reduce the risk of **cancer** and **heart disease** by repairing cellular damage and protecting the body from environmental toxins. Ultraviolet (UV) wavelengths can generate molecules called free radicals that can damage living cells. Free radicals are molecules, or fragments of molecules, that are unstable and highly reactive. Free radicals are produced as the result of a normal molecule losing or gaining an electron. In normal, stable molecules, electrons associate in pairs. However, radiation from the sun can result in the removal of an electron from a molecule and the formation of free radical. Flavonoids as **antioxidants** limit free radical damage by donating electrons to quench, or neutralize, the oxidant radicals.

In human **nutrition**, the antioxidant properties of flavonoids serve to protect cells from the danger of free radicals that may be produced by the body during metabolism or by cigarette smoke, sunlight, radiation, pollutants, or even **stress**. Tens of thousands of free radicals are created in the body every second. When a free radical captures an electron from another molecule, a new free radical is created as the second molecule has a lone, unpaired electron. This new free radical seeks to capture another electron and become normal again. This continual process of forming free radicals becomes a chain reaction. Unless quenched, these free radicals can damage DNA, fats, and proteins. However, the body has a defense against these free radicals. With proper nourishment, the body can make sufficient quantities of antioxidant enzymes and substrates for those enzymes that can facilitate the quenching of free radical reactions by antioxidants. These enzymes include superoxide dismutase, catalase, and **glutathione** peroxidase. In addition to these enzymes produced by the body, antioxidant nutrients taken into the body through foods or through dietary supplements also can surrender electrons to the free radicals without adding to the chain reaction, thus terminating the free radical reactions. Antioxidant nutrients include bioflavonoids; vitamins A, C, and E; lipoic acid; and **carotenoids**.

General use

Several research studies have reported a reduced risk of heart disease associated with flavonoid intake.

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In one 2007 study, daily treatment with 270 mg citrus flavonoids plus 30 mg tocotrienols improved cardiovascular parameters compared to placebo, with significant reductions in total **cholesterol**, LDL, apolipoprotein B, and trigilycerides. The exact cardioprotective properties of flavonoids were still being defined in the medical literature as of 2008, but these actions are thought to aid in the defense against cardiovascular disease:

- reduce oxidation of LDL cholesterol
- inhibit platelet activation, which may affect the relaxation capabilities of blood vessels
- balance levels of eicosanoids

Other published benefits of citrus flavonoids, particularly diosmin, include improvement of venous tone, increased **lymphatic drainage**, inhibition of inflammatory reactions, and protection against microcirculatory damage, making it a promising and effective treatment for peripheral vascular and venous diseases, such as chronic venous insufficiency and venous ulceration. Additionally, hespiridin and ascorbic acid combination has been shown to reduce symptoms of **hot flashes** in menopausal women.

Preparations

Although not classified as essential nutrients, flavonoids are important substances in human food sources, especially in citrus fruits, vegetables, nuts, and wine, that provide many health benefits. A diet that includes many types of fruits, vegetables, and nuts supplies the essential flavonoids and their associated health benefits. Five servings of a variety of fruits and vegetables is the recommended daily intake. The more common flavonoids are also available as dietary supplements.

Diosmin is a hespiridin-derivitive extracted from citrus rinds, although it has different molecular properties than hespiridin.

While preliminary research shows promise for the health benefits of flavonoids, more research is needed to quantify the amount of supplementation that yields health benefits. There are no recommended daily allowances for flavonoid supplements, but 500 mg two to three times per day is the suggested daily dosage. When taken with **vitamin C**, flavonoids help to increase the absorption of this vitamin and prolong its effects.

Precautions

Daily dosage on the product label should not be exceeded.

In the United States, dietary supplements are not required to be standardized. Although regulated under the 1994 Dietary Supplement Health and Education Act (DSHEA), there are no safety reviews or approved therapeutic uses for citrus flavonoid supplements by the U.S. Food and Drug Administration (FDA). After the product is marketed, the FDA must prove the dietary supplement unsafe before it can be removed from the shelves.

Manufacturing guidelines for herbal remedies are not standardized; therefore, preparations can vary widely from one brand to another and within the same brand from one purchase to the next, making inconsistency in the concentration of ingredients a potential risk. Anyone using herbal products should be careful and try to use well-known brands because these products are largely unregulated.

Many people associate the term "natural" with "safe," yet that is not always the case. Anyone taking herbal products of any kind should be certain to read labels carefully and discuss the products with a physician to evaluate potential interactions with other medical conditions and/or prescription medications.

Side effects

Citrus flavonoid dietary supplements are generally safe and do not produce side effects when taken according to proper dosing guidelines.

Interactions

There are no documented interactions between citrus flavonoid supplements and other herbal remedies. Citrus flavonoid supplements derived from grapefruit may interfere with the action of anticoagulant medications such as warfarin (Coumadin) and other pharmaceutical preparations. Patients should discuss their interest in using citrus flavonoid supplements with their doctor to identify any potential interactions with current prescription medications.

Flavonoids seem to work best together in a complementary and synergistic manner to provide antioxidant and other health benefits; they also seem to work well with other antioxidants. Therefore, the use of a mixed citrus flavonoid supplement in combination with a multi-antioxidant formula, along with a diet rich in a variety of fruits, vegetables, and nuts is most desirable. As of 2008 research was ongoing to gain a better understanding of potential interactions.

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KEY TERMS

Antioxidant—A substance that protects against the oxidative processes that may lead to cellular damage. Antioxidants are associated with a reduced risk of cancer, cardiovascular disease, and other medical conditions. Flavonoids are a type of antioxidant.

Eicosanoids—Hormone-like compounds thought to protect against cardiovascular disease.

Free radicals—Molecules, or fragments of molecules, that are unstable and highly reactive. Antioxidants appear to provide protection against free radicals.

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Food and Nutrition Information Center, National Agricultural Library, United States Department of Agriculture, 10301 Baltimore Ave., Room 105, Beltsville, MD, 20705, (301) 504-5414, http:fnic.nal.usda.gov.

International Food Information Council, 1100 Connecticut Ave. NW, Suite 430, Washington, DC, 20036, (202) 296-6540, http://www.ific.org.

National Center for Complementary and Alternative Medicine, National Institutes of Health, 9000 Rockville Pike, Bethesda, MD, 20892, (888) 644-6226, http://www.nccam.nih.gov.

Office of Dietary Supplements, National Institutes of Health, 6100 Executive Blvd., Room 3B01, MSC 7517, Bethesda, MD, 20892-7517, (301) 435-2920, http://ods.od.nih.gov.

Angela M. Costello

Hiatal hernia

Definition

A hiatal hernia is an abnormal protrusion of the stomach up through the diaphragm and into the chest cavity.

Description

A hiatal or diaphragmatic hernia is different from abdominal hernias in that it is not visible on the outside of the body. With a hiatal hernia, the stomach bulges upward through the esophageal hiatus (the hole through which the esophagus passes) of the diaphragm. This type of hernia occurs more often in women than in men, and it is treated differently from other types of hernias.

Causes and symptoms

A hiatal hernia may be caused by **obesity**, **pregnancy**, **aging**, or previous surgery. About half of all people with hiatal hernias do not have any symptoms. For those who do, symptoms include **heartburn**, usually 30 to 60 minutes after a meal, or mid-chest **pain** due to gastric acid from the stomach being pushed up into the esophagus (gastroesophageal reflux disease, or GERD). The pain and heartburn are usually worse when lying down. Frequent belching and feelings of abdominal fullness may also occur.

Diagnosis

The diagnosis for a hiatal hernia is based on a person's reported symptoms. The doctor may then order tests to confirm the diagnosis. If a barium swallow is ordered, the person drinks a chalky white barium solution that helps any protrusion through the diaphragm to show up more clearly on the x ray

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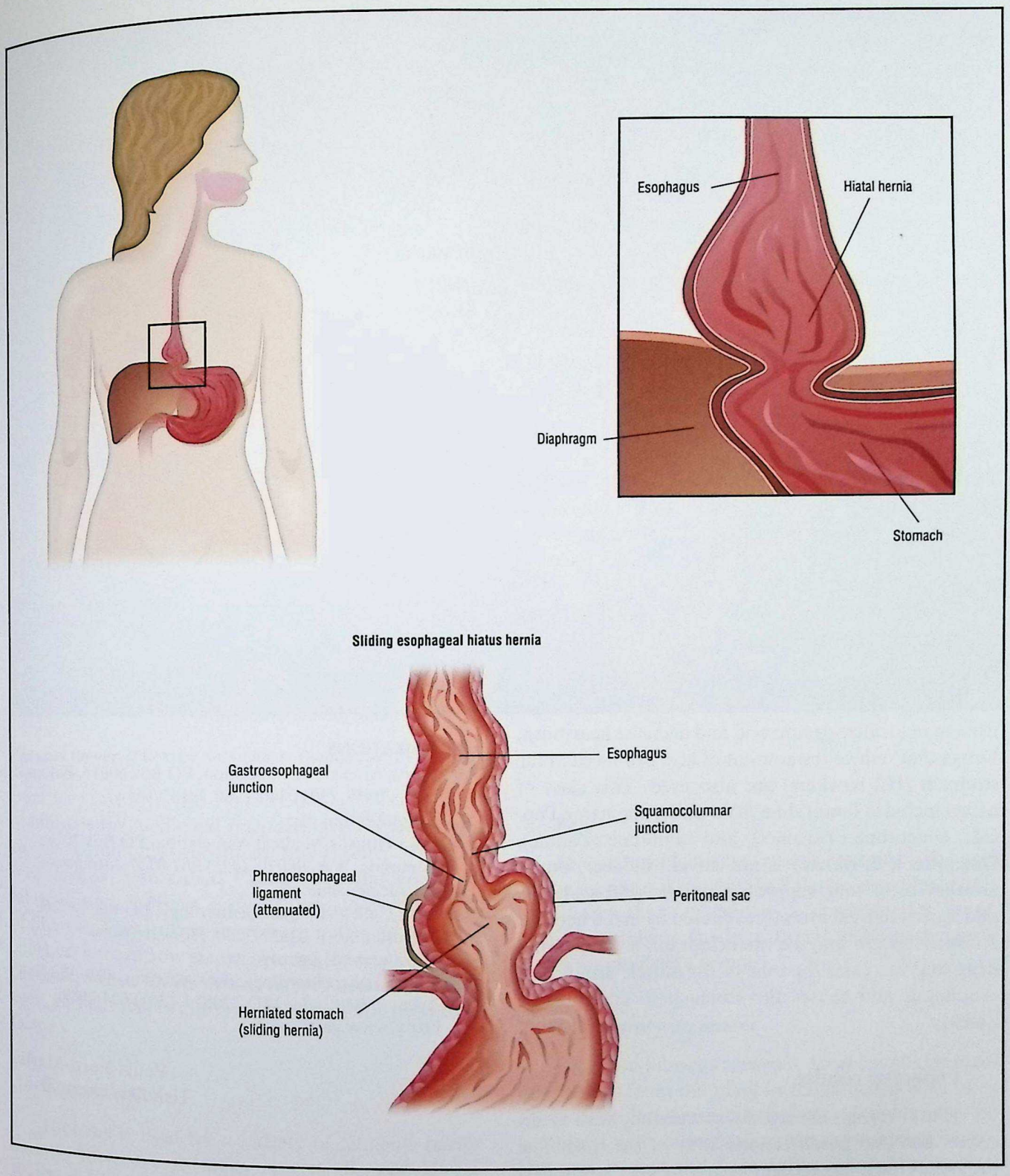

View and position of hiatal hernia in the body. *(Illustration by GGS Information Services, Inc. Cengage Learning, Gale)*

that follows. As of 2008, a diagnosis of hiatal hernia was more frequently made by endoscopy. This procedure is done by a gastroenterologist (a specialist in digestive diseases). During an endoscopy the person is given an intravenous sedative and a narrow tube is inserted through the mouth and esophagus, into the stomach where the doctor can visualize the hernia. The procedure takes about 30 minutes and may cause

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some discomfort, but usually no pain. It is done on an outpatient basis.

Treatment

Dietary and lifestyle adjustments to control a hiatal hernia include:

- avoiding reclining after meals
- avoiding spicy foods, acidic foods, alcohol, and tobacco
- eating small, frequent, bland meals to keep pressure on the esophageal sphincter
- eating a high-fiber diet
- raising the head of the bed several inches with blocks to improve both the quality and quantity of sleep

Visceral manipulation, done by a trained therapist, can help return the stomach to its proper position. **Deglycyrrhizinated licorice** (DGL) helps balance stomach acid by improving the protective substances that line the stomach and intestines and by improving blood supply to these tissues. DGL does not interrupt the normal function of stomach acid.

Allopathic treatment

There are several types of medications that help to manage the symptoms of a hiatal hernia. Antacids are used to neutralize gastric acid and decrease heartburn. Drugs that reduce the amount of acid produced in the stomach (H2 blockers) are also used. This class of drugs includes famotidine (sold under the name Pepcid), cimetidine (Tagamet), and ranitidine (Zantac). Omeprazole (Prilosec) is not an H2 blocker, but is another drug that suppresses gastric acid secretion and is used to treat symptoms caused by hiatal hernias. Another option may be metoclopramide (Reglan), a drug that increases the tone of the muscle around the esophagus and causes the stomach to empty more quickly.

Expected results

Hiatal hernias are treated successfully with medication and diet modifications 85% of the time. The prognosis remains excellent even if surgery is required in adults who are otherwise in good health.

Prevention

Some hernias can be prevented by maintaining a reasonable weight, avoiding heavy lifting and **constipation**, and following a moderate **exercise** program to maintain good abdominal muscle tone.

KEY TERMS

Endoscopy—A diagnostic procedure in which a tube is inserted through the mouth, into the esophagus and stomach. It is used to visualize various digestive disorders, including hiatal hernias.

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ORGANIZATIONS

Alternative Medicine Foundation, PO Box 60016, Potomac, MD, 20859, (301) 340-1960, http://www.amfoundation.org.

American Holistic Medical Association, PO Box 2016, Edmonds, WA, 98020, (425) 967-0737, http://www.holisticmedicine.org.

American College of Gastroenterology, PO Box 342260, Bethesda, MD, 20827-2260, (301) 263-9000, http://www.acg.gi.org.

American Gastroenterological Association, 4930 Del Ray Avenue, Bethesda, MD , 20814, (301) 654-2089, http://www.gastro.org.

Paula Ford-Martin
Tish Davidson, A. M.

Hibiscus

Description

Hibiscus is the name given to more than 250 species of herbs, shrubs, and trees of the mallow or Malvaceae family. The most commonly used species

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Hibiscus flower. *(Photo by Kelly Quinn. Reproduced by permission.)*

of hibiscus for medicinal purposes are *Hibiscus sabdariffa*, commonly known as the roselle; *Hibiscus rosa-sinensis*, also called China rose and common hibiscus; and *Hibiscus syriacus*, known as the Rose of Sharon. These three shrubs are native to tropical climates, but are now grown around the world. Hibiscus is renowned for its beauty as well as its medicinal uses, and gardeners cultivate the plant for its showy flowers.

General use

Hibiscus is used for a variety of ailments partly because there are so many species. Roselle lowers fevers and high blood pressure, increases urination, relieves coughs, and has been found to have antibacterial properties. All parts of the plant are used, from the seeds to the roots. Common hibiscus is used mainly for respiratory problems, but is also widely used for skin disorders or to treat fevers. Rose of Sharon is used externally as an emollient, but is also taken internally for gastrointestinal disorders.

Fever

As a natural febrifuge, roselle contains citric acid which is a natural coolant. In Pakistan and Nepal, it is the flowers that are used as a treatment for **fever**. Common hibiscus has been found to be particularly useful for children's fevers.

Respiratory disorders

Common hibiscus is used to treat coughs by placing extracts from the plant in the patient's bath or in water used for steam inhalations. Hibiscus is often combined with other herbs to make a **cough** syrup. Hibiscus is used widely in Cuba, where the tropical climate contributes to respiratory illnesses, and where hibiscus is readily found.

Hypertensive conditions

Roselle and rose of Sharon contain hypotensive compounds that lower the blood pressure. Roselle's ability to lower blood pressure may be due to its

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KEY TERMS

Abortifacient—A substance that induces abortions.

Anthelminthic—A medication that destroys or expels parasitic worms from the digestive tract.

Antispasmodic—A medication that prevents or relieves involuntary muscular cramps.

Emollient—A substance that softens and smoothes the skin.

Febrifuge—A substance or medication that lowers or dispels fevers.

diuretic and laxative effects. The plant contains ascorbic and glycolic acid, which increase urination.

Skin conditions

Hibiscus is a natural emollient, used for softening or healing the skin. The leaves and flowers of the roselle are used all around the world for their emollient qualities. When the leaves are heated, they can be placed on cracked feet or on **boils** and ulcers to promote healing. Since the herb is a cooling herb, when applied externally it cools the surface of the skin by increasing blood flow to the epidermis and dilating the pores of the skin. A lotion made from a decoction of hibiscus leaves can be used to soothe **hemorrhoids**, **sunburn**, open sores, and **wounds**.

Other conditions

Hibiscus has been credited with a wide range of healing properties. In Colombia, the plant is used to treat **hair loss** and scurvy; in Samoa, it is commonly given to women who are suffering from menstrual cramps or who are in **childbirth**, as the leaves ease labor pains. In the Cook Islands and the Philippines, the flowers are used to induce abortions. In a 1962 study, hibiscus was confirmed to be hypotensive, as well as antispasmodic, anthelminthic, and antibacterial. In subsequent studies, the plant was found to effectively work against such diseases as ascariasis and **tuberculosis**. Studies in France, Malaysia, and Egypt have found that the plant has anticarcinogenic effects.

Preparations

A decoction of hibuscus can be made by pouring 1 cup of boiling water over 2 tsp of dried blossoms or 1 tsp of crumbled blossom. Steep for 10 minutes. In addition, many commercial herbal teas contain hibiscus.

Precautions

Since there are over 250 species of hibiscus, it is essential to identify the species of the herb before taking it. Since some species of hibiscus are used as abortifacients, the plant should not be used by women who are pregnant or nursing.

Side effects

Some drinks made from roselle can have alcoholic effects. The plant can also be mildly hallucinogenic.

Interactions

There are no known interactions between hibiscus and standard pharmaceutical preparations. Because it is a tart plant, however, it may not mix harmoniously with other tannic herbs. Mint leaves or rose hips are good to blend with hibiscus.

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Katherine Y. Kim

Hiccups

Definition

Hiccups are the result of an involuntary, spasmodic contraction of the diaphragm followed by the closing of the throat.

Description

Virtually everyone experiences hiccups, but they rarely last long or require a doctor's care. Occasionally, a bout of hiccups will last longer than two days, earning it the name "persistent hiccups." Very few people will experience intractable hiccups, in which hiccups last longer than one month.

A hiccup involves the coordinated action of the diaphragm and the muscles that close off the windpipe (trachea). The diaphragm is a dome-shaped muscle separating the chest and abdomen. It is normally responsible for expanding the chest cavity for inhalation. Sensation from the diaphragm travels to the spinal cord through the phrenic nerve and the vagus

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KEY TERMS

Innervate—To supply a part of the body with nerves. For example, the vagus nerve supplies nerve function to the eardrum; therefore, we say that the eardrum is innervated by the vagus nerve.

Nerve—Fibers that carry sensory information, movement stimuli, or both from the brain and spinal cord to other parts of the body and back again. Some nerves, including the vagus nerve, innervate distantly separated parts of the body.

nerve, which pass through the chest cavity and the neck. Within the spinal cord, nerve fibers from the brain monitor sensory information and adjust the outgoing messages that control contraction. These messages travel along the phrenic nerve.

Irritation of any of the nerves involved in this loop can cause the diaphragm to undergo involuntary contraction, or spasm, pulling air into the lungs. When this occurs, it triggers a reflex in the throat muscles. Less than a tenth of a second afterward, the trachea is closed off, making the characteristic "hic" sound.

Causes and symptoms

Hiccups can be caused by disorders of the central nervous system, by injury or irritation to the phrenic and vagus nerves, and by toxic or metabolic disorders affecting the central or peripheral nervous systems. They may be of unknown cause or may be a symptom of psychological **stress**. Hiccups often occur after drinking carbonated beverages or alcohol. They may also follow overeating or rapid temperature changes. Persistent or intractable hiccups may be caused by any condition that irritates or damages the relevant nerves, including:

- overstretching of the neck
- laryngitis
- heartburn (gastroesophageal reflux)
- irritation of the eardrum (which is innervated by the vagus nerve)
- general anesthesia
- surgery
- bloating
- tumor
- infection
- diabetes

Diagnosis

Hiccups are diagnosed by observation and by hearing the characteristic sound. Diagnosing the cause of intractable hiccups may require imaging studies, blood tests, pH monitoring in the esophagus, and other tests.

Treatment

Most cases of hiccups will disappear on their own. Home remedies, which interrupt or override the spasmodic nerve circuitry, are often effective. Such remedies include:

- Holding one's breath for as long as possible.
- Breathing into a paper bag.
- Swallowing a spoonful of sugar or peanut butter.
- Bending forward from the waist and drinking water from the wrong side of a glass.

Acupressure techniques can also be helpful in eliminating hiccups. Acupressure is a Chinese medicine treatment that involves placing pressure on different points of the body, called acupoints. It is based on the premise that good health is based on a harmony of energy flow, or *qi*, throughout the body. By placing pressure on acupoints, qi is balanced and harmony—and health—is restored to the patient.

To treat hiccups through acupressure, rest the heels of the palms on both cheekbones while placing hands over the eyes. Massage the temples by pulling the thumbs in towards the palm. After massaging, remove the hands from the eyes and lightly press the tip of the nose with a fingertip.

Allopathic treatment

Treating any underlying disorder will usually cure the associated hiccups. Chlorpromazine (Thorazine) relieves intractable hiccups in 80% of cases. Metoclopramide (Reglan), carbamazepam, valproic acid (Depakene), and phenobarbital are also used. As a last resort, surgery to block the phrenic nerve may be performed, although it may lead to significant impairment of respiration.

Expected results

Most cases of hiccups last no longer than several hours, with or without treatment.

Prevention

Some cases of hiccups can be avoided by drinking in moderation, avoiding very hot or very cold food, and avoiding cold showers. When carbonated beverages are

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drunk through a straw, more **gas** is delivered to the stomach than when they are sipped from a container; therefore, avoid using straws.

Resources

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Paula Ford-Martin

High-protein diet *see* **Atkins diet**
High blood pressure *see* **Hypertension**
High cholesterol *see* **Cholesterol**

High-fiber diet

Definition

Fiber is the material that gives plants texture and support. Dietary fiber is found in many plant foods such as fruits, vegetables, beans, nuts, and whole grains. Although it is primarily made up of carbohydrates, it does not have a lot of calories and usually is not broken down by the body for energy. Fiber is sometimes called roughage.

Dietary fiber belongs to one of two types, depending on whether or not it is able to dissolve in water. Fiber that dissolves in water is called *soluble*, while fiber that cannot be dissolved in water is known as *insoluble*. Upon ingestion, soluble fiber dissolves in the fluids secreted by the digestive tract, forming a gel. This gel moves slowly through the digestive tract, thus slowing the rate of digestion and absorption. **Diets** containing large amounts of soluble fiber have been shown to stabilize blood sugar levels in people with diabetes, and have been shown to reduce blood levels of unhealthy (LDL) **cholesterol**. Foods high in soluble fiber include beans, lentils, oats, **psyllium**, citrus fruits, barley and apples. In contrast, insoluble fiber acts as roughage. It contributes to stool bulk and promotes regularity. Foods rich in insoluble fiber include wheat bran, whole grains, dried beans, nuts, seeds, and those fruits and vegetables with an edible outer skin or seeds.

Adequate intake of fiber

Age	g/day
Children > 1 yr.	Not established
Children 1-3 yrs.	19
Children 4-8 yrs.	25
Boys 9-13 yrs.	31
Girls 9-13 yrs.	26
Boys14-18 yrs.	38
Girls 14-18 yrs.	26
Men 19-50 yrs.	38
Women 19-50 yrs.	25
Men > 50 yrs.	30
Women > 50 yrs.	21
Pregnant women	28
Breastfeeding women	29

Foods that contain fiber	mcg
Beans, lima, fresh, cooked, 1/2 cup	6.6
Beans, baked, canned, plain, 1/2 cup	6.3
Beans, black, cooked, 1/2 cup	6.1
Beans, kidney, fresh, cooked, 1/2 cup	5.7
Winter squash, cooked, 1 cup	5.7
Spaghetti, whole wheat, plain, 1 cup	5.6
Cereal, bran flake, 3/4 cup	5.3
Cereal, shredded wheat, 1 cup	5.2
Pear, raw, 1 med.	5.1
Turnips, cooked, 1/2 cup	4.8
Rice, brown, cooked, 1 cup	3.5
Apple, raw, with skin, 1 med.	3.3
Oatmeal, plain, cooked, 3/4 cup	3.0
Broccoli, fresh, cooked, 1/2 cup	2.6
Summer squash, cooked, 1 cup	2.5
Carrot, fresh, cooked, 1/2 cup	2.3
Potato, fresh, cooked, 1	2.3
Spinach, fresh, cooked, 1/2 cup	2.2
Brussels sprouts, fresh, cooked, 1/2 cup	2.0
Bread, whole-wheat, 1 slice	1.9
Tangerine, raw, 1 med.	1.9
Cauliflower, fresh, cooked, 1/2 cup	1.7
Cabbage, fresh, cooked, 1/2 cup	1.5
Peach, raw, 1 med.	1.5
Asparagus, fresh, cooked, 4 spears	1.2
Romaine lettuce, 1 cup	1.2
Peanuts, dry roasted, 1 tbsp	1.1
Tomato, raw, 1	1.0
Rice, white, cooked, 1 cup	0.6
Almonds, slivered, 1 tbsp.	0.6

mcg = microgram

(Illustration by GGS Information Services. Cengage Learning, Gale)

Origins

High-fiber diet therapy is actually a return to nature and the plant-based diets used by our ancestors since the beginning of time. In fact, our ancestors consumed large quantities of fiber-containing foods such as fruits, vegetables and whole grain products every day. As technology advanced, however, people began to turn away from these unprocessed healthful foods and began eating more highly processed and fat-

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laden foods. As a result, the incidence of coronary **heart disease**, diabetes and cancers has steadily risen.

No single person developed the high-fiber diet. Over the years, researchers have compared the rate of various chronic diseases in populations that had high-fiber diets with those that had lower dietary fiber intake. They found, for example, that native Africans who ate a high-fiber, plant-based diet are rarely bothered **constipation**. However, in industrialized countries where a lot of animal products are consumed, constipation is common. Observations like this encouraged researchers to look at other roles that dietary fiber might play in health. From their findings came a consensus that a high-fiber diet is a healthy diet. This is reflected in the Dietary Guidelines for Americans 2005, which encourage people to eat more high-fiber foods such as whole grains.

Benefits

A high-fiber diet helps prevent or treat the following health conditions:

- High blood cholesterol levels. Fiber effectively lowers blood cholesterol levels. It appears that soluble fiber binds to the cholesterol molecule and moves it through the digestive tract so that it can be excreted from the body. This mechanism prevents cholesterol from being reabsorbed into the bloodstream.
- Constipation. A high-fiber diet is a useful non-drug treatment for constipation. Fiber in the diet adds more bulk to the stools, making them softer. Fiber also shortens the length of time that foods remain in the digestive tract. It is important, however, for people increasing their fiber intake to drink more water as well, in order to get the benefit of using dietary fiber to relieve constipation.
- Hemorrhoids. Fiber in the diet adds more bulk and softens the stool, thus reducing the pain and bleeding associated with hemorrhoids.
- Diabetes. A common problem for diabetics is the rapid rise of insulin levels following meals. Soluble fiber in the diet delays the emptying of the stomach contents into the intestines. This delay helps to slow the rise of blood sugar levels following a meal and thus gives diabetics greater control over their condition.
- Obesity. Dietary fiber makes a person feel full more rapidly. It can thus help a person lose weight by making the appetite easier to control.
- Colon cancer. Claims have been made that a diet high in fiber reduces the risk of colon cancer. The theory is that fiber speeds up the elimination of waste from the colon. This decreases the time that cells lining the intestinal wall are exposed to potential cancer-causing agents. However, in the mid-2000s, a study that followed 80,000 nurses for 16 years found no relationship between dietary fiber and colon cancer. More research remains to be done in this area.
- Breast cancer. A high dietary consumption of fats is associated with an increased risk of breast cancer. Because fiber reduces fat absorption in the digestive tract, it may prevent breast cancer. In 2003, a study confirmed these findings and showed that women who consumed more fiber and vitamin E also had a lower risk of developing benign breast disease, a condition which can lead to breast cancer.
- Prostate cancer. Though research is still relatively new, Dr. Dean Ornish presented data in April 2002 on a study that showed how a high-fiber vegan diet could slow or even stop prostate cancer for men in early stages of the disease. Men who submitted to an extremely low-fat, vegan diet consisting of fruits, vegetables, whole grains, beans and soy products instead of dairy, and who gave up alcohol and agreed to exercise three hours a week, relax and meditate one hour a day showed improvements in markers for prostate cancer indicators. Patients should not try this regimen unless they first discuss it with their doctors and it should complement other physician–ordered treatments.

Description

The United States Institute of Medicine (IOM) of the National Academy of Sciences has set dietary reference intakes (DRIs) for fiber based on research data that applies to American and Canadian populations. DRIs provide **nutrition** guidance to both health professionals and consumers. The current daily DRIs for fiber are as follows:

- children ages 1–3 years: 19 grams
- children ages 4–8 years: 25 grams
- men ages 14–50: 38 grams
- men age 51 and older: 30 grams
- girls ages 9–18: 26 grams
- adult women ages 19–50: 25 grams
- women age 51 and older: 21 grams
- pregnant women: 28 grams
- breastfeeding women: 29 grams

An individual can generally get 25–35 g of fiber daily by eating two to three servings of fruits and three to five servings of vegetables every day. To increase fiber intake, an individual should eat more of the following high-fiber foods: whole grains, beans, fruits (preferably with skins on), roots and leafy vegetables,

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broccoli or carrots. As an added bonus, he or she will also receive other health benefits provided by the vitamins, minerals, **antioxidants** and cancer-fighting phytochemicals in these foods.

Preparations

For the greatest benefit to health, people should have both soluble and insoluble fiber in their diet, preferably in a 50:50 ratio. The following foods are good sources of insoluble fiber:

- wheat bran
- whole wheat products
- cereals made from bran or shredded wheat
- crunchy vegetables
- barley
- grains
- whole wheat pasta
- rye flour

Good sources of soluble fiber include:

- oats
- oat bran
- oatmeal
- apples
- citrus fruits
- strawberries
- dried beans
- barley
- rye flour
- potatoes
- raw cabbage
- pasta

Precautions

Few risks are associated with a high-fiber diet in healthy individuals. However, in people with gastrointestinal disorders such as **irritable bowel syndrome** and **inflammatory bowel disease**, a high-fiber diet may irritate the bowel and worsen their symptoms. Likewise, people who have had a surgical weight-loss procedure may be unable to tolerate a high-fiber diet. Adding bran fiber to foods is not recommended due to the risk of poor intakes of some vitamins that bind with phytates and oxalates in many high-fiber foods.

High-fiber therapy must be part of a balanced diet that includes adequate water intake and also provides the proper amounts of essential vitamins and minerals, including **calcium**, **iron** and **zinc**.

KEY TERMS

Cellulose—The primary substance composing the cell walls or fibers of all plant tissues.

Hemorrhoid—A varicose vein in the area around the anus. Hemorrhoids sometimes cause pain and bleeding.

Naturopathy—A school of alternative medicine that focuses on natural healing. Therapies provided by practitioners of naturopathy often include diet, exercise, supplement and hydrotherapy and may also include osteopathic and chiropractic treatments.

Roughage—Another name for dietary fiber.

Fiber supplements such as psyllium may reduce the absorption of certain medications when taken at the same time. In general, medications should be taken at least one hour before or two hours after fiber supplements.

Side effects

Fiber should be increased in the diet gradually. If fiber intake increases suddenly, abdominal **pain**, **gas**, and **diarrhea** may result. Also, when eating a high-fiber diet, it is important to drink at least 8 glasses (64 oz or 2 L) of water or other fluids daily. People whose fluid intake must be restricted for medical reasons should avoid a high-fiber diet.

Research and general acceptance

As a result of the large volume of scientific evidence supporting the use of fiber in disease prevention and treatment, high-fiber diet treatments have been accepted and advocated by practitioners of alternative and conventional medicine alike. High-fiber diets have been endorsed by the American Heart Association, the American Dietetic Association, the National Cancer Institute, the National Research Council, and the United States Department of Health and Human Services.

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ORGANIZATIONS

American Association of Naturopathic Physicians, P.O. Box 20386, Seattle, WA, 98102, (206) 323-7610

American Dietetic Association, 120 South Riverside Plaza, Suite 2000, Chicago, IL, 60606-6995, (800) 877-1600, http://www.eatright.org.

American Heart Association, 7272 Greenville Avenue, Dallas, TX, 75231, (800) 242-8721, http://www.americanheart.org.

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High sensitivity C-reactive protein test

Definition

The high sensitivity C-reactive protein (CRP) test is a blood assay used to estimate an individual's risk for **heart disease** and **stroke**. The test also measures the presence of inflammation or infection.

Origins

In the late twentieth century, the primary methods of measuring a person's risk of heart disease included traditional factors such as age, family history of heart disease or stroke, past heart disease, **smoking**, **obesity**, and tests that measured lipids in the bloodstream, including low-density lipoprotein (LDL). Low-density lipoproteins ("bad" **cholesterol**) were previously considered the gold standard in risk factor prediction.

In the 1990s and early twenty-first century, several new tests came into widespread use. These tests are considered better predictors of heart disease risk. They include blood tests to measure the levels of homocysteine, lipoprotein(a), fibrinogen, and highly sensitive C-reactive protein. They are called emerging or non-traditional risk factors.

Benefits

Knowing one's highly sensitive C-reactive protein levels can help a person manage and lower his or her risk for heart disease. Factors that lower highly sensitive CRP levels include weight loss, regular **exercise**, a healthy diet, and smoking cessation. Medicines may also be needed. Medications include a class of drugs called statins, with brand names such as Lipitor, Zocor, Crestor, and Pravachol. Other interventions may include Zetia, a cholesterol absorption inhibitor, and a class of drugs called thiazoladinediones, such as the diabetes brand name medications, Avandia and Actos.

According the American Heart Association, the three risk levels associated with high sensitivity CRP levels are:

- Low risk: under 1 milligram per liter of blood.
- Average risk: 1 to 3 milligrams per liter of blood.
- High risk: More than 3 milligrams per liter of blood.

Description

C-reactive protein is produced by the liver, and is not normally found in the blood in high amounts. It is rapidly produced following an injury, bacterial or fungal infection, or inflammation. It disappears quickly once the injury, illness, or inflammation heals or resolves. High CRP levels following surgery or an injury are a good indication that an infection is present. Until early this century, the blood test used to detect CRP levels could only measure them down to 3 milligrams per liter of blood or higher. Improvements in technology have permitted more precise measurements of CRP levels ranging from less than 0.3 milligrams to 3 milligrams per liter of blood. The more precise measurement is called the high sensitivity C-reactive protein (hsCRP) test.

While levels under 3 milligrams per liter of blood do not necessarily indicate an infection, they do indicate the presence of an inflammatory reaction. Researchers found that these lower amounts of CRP in the body are extremely useful in predicting coronary

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KEY TERMS

Anticoagulant— Medication that prevents blood clotting.

C-reactive protein—A protein produced in the liver that is not normally found in the blood in high amounts. It is elevated when infection or inflammation are present. A test that measures this substance in the bloodstream serves as a predictor of heart disease or stroke.

Centrifuge—A machine that rotates rapidly and uses centrifugal force to separate substances of different densities.

Cholesterol—A compound found in animal tissue and blood, of which high levels in the blood are linked to clogged arteries, heart disease, and gallstones.

Cholesterol absorption inhibitor—A substance that decreases the absorption of cholesterol in the intestines.

Diabetes—Several metabolic disorders in which the body produces insufficient insulin or is resistant to the insulin it does produce, causing glucose levels to rise in the blood.

Fasting—Avoiding food for a period of time.

Fibrinogen—A protein that is important in blood clotting.

Homocysteine—An amino acid, derived from protein in food, that can build up in the blood and contribute to the development of heart disease.

Lipids—Organic compounds that are greasy, insoluble in water, but soluble in alcohol. Fats, waxes, and oils are examples of lipids.

Lipoprotein(a)—A type of bad cholesterol that increases the risk of heart attack or stroke.

Low-density lipoprotein—LDL, the so-called bad cholesterol.

Plasma—A clear yellowish fluid that is a component of blood.

Statins—A class of drugs used primarily, but not exclusively, to treat high cholesterol.

Thiazoladinediones—A class of drugs typically used to treat diabetes and insulin resistance.

heart disease (CHD). However, since CRP levels vary on different days, at least two separate measurements are needed to adequately determine a person's CHD risk level.

To take the high sensitivity CRP test, a healthcare worker draws blood from a vein, and into a tube. In the laboratory, the tube of blood spins at high speed within a machine called a centrifuge. The blood cells sink to the bottom and the liquid stays on the top. This straw-colored liquid on the top is the plasma. To measure the high sensitivity CRP, a person's plasma is combined with other substances. From the resulting reaction, the amount of CRP in the plasma is determined.

A study released in 2003 by the College of American Pathologists found varying outcomes when it compared results from five different methods in identifying hsCRP. A 2001 study by several university medical departments found that six out of nine hsCRP testing methods did not produce results as accurate as the manufacturers claimed. In 2003, the Centers for Disease Control and Prevention announced it would attempt to address these issues.

Preparations

Unlike some blood tests that require **fasting**, the high sensitivity C-reactive protein test can be done either before or after eating. No other preparations are needed.

Each high sensitivity CRP test requires a 5-milliliter blood sample. A healthcare worker usually ties a tight band (tourniquet) on the person's upper arm. The blood is drawn from a vein in the arm, usually at the inside of the elbow or on the back of the hand. The needle insertion site is cleaned with antiseptic. A small needle is inserted through the skin and into the vein, allowing the blood sample to flow into a collection tube or syringe. Once the blood is collected, the needle is removed from the puncture site. Collecting the blood sample takes several minutes or less.

Precautions

The primary risk to the patient is a mild stinging or burning sensation during the drawing of blood, with minor swelling or bruising afterward. Some patients may feel faint or lightheaded when blood is drawn.

Side effects

There are generally no side effects associated with the test. Any weakness, fainting, sweating, or other unusual reaction should be immediately reported.

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Research and general acceptance

Several large-scale scientific studies have shown that high sensitivity C-reactive protein levels are a strong predictor of future heart attacks and strokes among apparently healthy men and women. Research has also shown that hsCRP test will play an important role in preventing heart disease, according to an article in the March 2001 issue of *Circulation*. The Centers for Disease Control and Prevention, and the American Heart Association, recommend limited use of hsCRP testing for assessing heart disease risk. The two groups recommend the test only when a physician is undecided about a course of treatment for a patient who is considered at intermediate risk for CHD. According to an article in the February 2003 issue of the *Harvard Health Letter*, a growing number of physicians believe everyone should be tested, and this test may eventually supplant cholesterol testing as a predictor of CHD.

Training and certification

Nurses are usually the health care professionals that administer high sensitivity CRP tests. Nurses can also help educate patients regarding the role that a proper diet and regular exercise can play in reducing the risk of CHD. However, the physician that recommends specific treatment and prescribes needed medication.

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American Heart Association National Center. 7272 Greenville Avenue, Dallas, TX 75231-4596. 800-242-8721. http://www.americanheart.org.

Ken R. Wells

HIV infection *see* **AIDS**

Hives

Definition

Hives are an allergic skin reaction causing localized redness, swelling, and **itching**.

Description

Hives are a reaction of the body's immune system that causes areas of the skin to swell, itch, and become reddened. (The areas are called wheals.) When the reaction is limited to small areas of the skin, it is called urticaria. Involvement of larger areas, such as whole sections of a limb, is called angioedema.

Causes and symptoms

Causes

Hives are an allergic reaction. The body's immune system is normally responsible for protection from foreign invaders. When it becomes sensitized to normally harmless substances, the resulting reaction is called an allergy. An attack of hives is set off when such a substance, called an allergen, is ingested, inhaled, or otherwise contacted. It interacts with immune cells called mast cells, which reside in the skin, airways, and digestive system. When mast cells encounter an allergen, they release histamine and other chemicals, both locally and into the bloodstream. These chemicals cause blood

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KEY TERMS

Allergen—A substance capable of producing an immediate type of hypersensitivity, or allergy.

Wheal—A smooth, slightly elevated area on the body surface, which is redder or paler than the surrounding skin.

vessels to become more porous, allowing fluid to accumulate in tissue and leading to the swollen and reddish appearance of hives. Some of the chemicals released sensitize **pain** nerve endings, causing the affected area to become itchy and sensitive.

A wide variety of substances may cause hives in sensitive people. Common culprits include:

- prescription and nonprescription drugs (Aspirin and penicillin are the two most commonly known causes of allergic reactions in adults.)
- nuts, especially peanuts, walnuts, and Brazil nuts
- fish, mollusks, and shellfish
- eggs
- wheat
- milk
- strawberries
- food additives and preservatives
- flu vaccines
- tetanus toxoid vaccine
- gamma globulin
- bee, wasp, and hornet stings
- bites of mosquitoes, fleas, and scabies.

In addition, hives may also be the body's response to certain physical conditions such as emotional **stress**, rubbing, cold wind, heat contact (**prickly heat** rash), wearing tight clothing, or **exercise** after a heavy meal.

Symptoms

Urticaria is characterized by redness, swelling, and itching of small areas of the skin. These patches usually grow and recede in less than a day, but may be replaced by others in other locations. Angioedema is characterized by more diffuse swelling. Swelling of the airways may cause **wheezing** and respiratory distress. In severe cases, airway obstruction may occur.

Diagnosis

Hives are easily diagnosed by visual inspection. The cause of hives is usually apparent, but may require a careful medical history in some cases.

Treatment

Home remedies

To deal with the symptoms of hives, an oatmeal bath may help to relieve itching. **Chickweed**, (*Stellaria media*), applied as a poultice (crushed or chopped herbs applied directly to the skin) or added to bath water, may also help relieve itching.

Nutritional therapy

Naturopaths or nutritionists will try to determine what allergic substance is causing the reaction and help the patient eliminate or minimize its effects. They may also recommend **vitamin C**, **vitamin B_{12}**, and **quercetin** (a flavonoid) supplements to help control acute or chronic hives.

Homeopathic therapy

The following homeopathic remedies have been used to relieve itching, redness or swelling associated with hives:

- urtica urens
- apis (Apis mellifica)
- sulfur

Allopathic treatment

Mild cases of hives are treated with antihistamines, such as diphenhydramine (Benadryl). More severe cases may require oral corticosteroids, such as prednisone. Topical corticosteroids are not effective. In 2002, the Food and Drug Administration (FDA) approved the allergy drug Claritin for over-the-counter use for patients with urticaria. The drug comes in tablet and syrup form and carries low risks. Its release for over-the-counter use was delayed until the company that manufactures the drug could add instructions for patients about self-diagnosis of hives. They cautioned it should only be used for recurrent hives that had already been diagnosed by a physician, not for acute or severe urticaria. Airway swelling may require emergency injection of epinephrine (adrenaline).

Expected results

Most cases of hives clear up within one to seven days without treatment, provided the cause (allergen) is found and avoided.

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Prevention

Preventing hives depends on avoiding the allergen causing them. Analysis of new items in the diet or new drugs taken may reveal the likely source of the reaction. Chronic hives may be aggravated by stress, **caffeine**, alcohol, or tobacco; avoiding these may reduce the frequency of reactions.

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Teresa G. Odle

Hodgkin's disease

Definition

Hodgkin's disease, also called Hodgkin's lymphoma, is a type of **cancer** involving tissues of the lymphatic system, or lymph nodes. Its cause is unknown, although some interaction between individual genetic makeup, family history, environmental exposures, and infectious agents is suspected.

Description

Hodgkin's lymphoma can occur at any age, although the majority of these lymphomas occur in people age 15–34, and over the age of 60. Lymphoma is a cancer of the lymphatic system. Depending on the specific type, a lymphoma can have any or all of the characteristics of cancer: rapid multiplication of cells, abnormal cell types, loss of normal arrangement of cells with respect to each other, and invasive ability.

KEY TERMS

Biopsy—The removal of a small sample of tissue, in order to carefully examine it under a microscope. This helps in the diagnosis of cancer, and can also reveal infection or inflammation.

Chemotherapy—Treatment for a disease involving various chemical or drug preparations; this term tends to refer to treatment for forms of cancer in particular.

Constitutional—Involving the whole body. A constitutional symptom, for example, is one that is not focused entirely in the diseased organ system, but affects the whole system (such as fever).

Radiation therapy —Also called radiotherapy, the treatment for a disease involving carefully measured exposure to radiation.

Staging—Using various methods of diagnosis to determine the extent of disease present in an individual. Staging is important as a way of determining the appropriate type of treatment for a particular disease, as well as helping to predict an individual's chance for cure from a particular disease.

Causes and symptoms

Hodgkin's lymphoma usually begins in a lymph node. The node enlarges and—similar to enlarged lymph nodes due to infectious causes—may or may not cause any **pain**. Hodgkin's lymphoma progresses in a fairly predictable way, traveling from one group of lymph nodes to another, unless it is treated. More advanced cases of Hodgkin's involve the spleen, liver, and bone marrow.

The features and prognosis of patients with Hodgkin's disease and non-Hodgkin's lymphoma (NHL) differ significantly. However, research in 2001 found that among patients with human immunodeficiency virus (HIV), Hodgkin's disease appears very similar to HIV-related non-Hodgkin's lymphoma. NHL occurs much more often in patients with HIV, but in recent years, a small but significant increase in Hodgkin's disease has been seen in HIV-infected patients.

Constitutional symptoms—symptoms that affect the whole body—are common. They include **fever**, weight loss, heavy sweating at night, and **itching**. Some patients note pain after drinking alcoholic beverages.

As nodes swell, they may push against nearby structures, resulting in other local symptoms. These symptoms include pain from pressure on nerve roots,

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as well as loss of function of specific muscle groups served by the compressed nerves. Kidney failure may result from compression of the ureters, the tubes which carry urine from the kidneys to the bladder. The face, neck, or arms may swell due to pressure slowing the flow in veins that should drain blood from those regions (superior vena cava syndrome). Pressure on the spinal cord can result in leg paralysis. Compression of the trachea and/or bronchi (airways) can cause **wheezing** and shortness of breath. Masses in the liver can cause the accumulation of certain chemicals in the blood, resulting in jaundice—a yellowish discoloration of the skin and the whites of the eyes.

As Hodgkin's lymphoma progresses, a patient's immune system becomes less and less effective at fighting infection. Thus, patients with Hodgkin's lymphoma become increasingly more susceptible to both common **infections** caused by bacteria and unusual (opportunistic) infections caused by viruses, fungi, and protozoa.

Diagnosis

Diagnosis of Hodgkin's lymphoma requires the removal of a sample of a suspicious lymph node (biopsy) and careful examination of the tissue under a microscope. In Hodgkin's lymphoma, certain characteristic cells—Reed-Sternberg cells—must be present in order to confirm the diagnosis. These cells usually contain two or more nuclei—oval, centrally-located structures within cells that house their genetic material. In addition to the identification of these Reed-Sternberg cells, other cells in the affected tissue sample are examined. The characteristics of these other cells help to classify the specific subtype of Hodgkin's lymphoma.

Once Hodgkin's disease has been diagnosed, staging is the next important step. This involves computed tomography (CT) scans of the abdomen, chest, and pelvis, to identify areas of lymph node involvement. In rare cases, a patient must undergo abdominal surgery so that lymph nodes in the abdominal area can be biopsied (staging laparotomy). Some patients have their spleens removed during this surgery, both to help with staging and to remove a focus of the disease. Bone marrow biopsy is also required unless there is obvious evidence of vital organ involvement. Some physicians also order a lymphangiogram—a radiograph of the lymphatic vessels.

Staging is important because it helps to determine what kind of treatment a patient should receive. On one hand, it is important to understand the stage of the disease so that the treatment chosen is sufficiently strong to provide the patient with a cure. On the other hand, all the available treatments have serious side effects, so staging allows the patient to have the type of treatment necessary to achieve a cure, and to minimize the severity of short and long-term side effects from which the patient may suffer.

Treatment

Hodgkin's disease is a life-threatening disease, and a correct diagnosis and appropriate treatment with surgery, chemotherapy, and/or radiation therapy is critical to controlling the illness.

Acupuncture, **hypnotherapy**, and **guided imagery** may be useful tools in treating pain symptoms associated with Hodgkin's. Acupuncture involves the placement of a series of thin needles into the skin at targeted locations on the body known as acupoints in order to harmonize the energy flow within the human body.

In guided imagery, the patient creates pleasant and comfortable mental images that promote **relaxation** and improve a patient's ability to cope with discomfort and pain symptoms. Other guided imagery techniques involve creating a visual mental image of pain. Once the pain can be visualized, the patient can adjust the image to make it more pleasing, and thus more manageable, to them.

A number of herbal remedies are also available to lessen pain symptoms and promote relaxation and healing. However, individuals should consult with their healthcare professionals before taking them. Depending on the preparation and the type of herb, these remedies may interact with or enhance the effects of other prescribed medications.

Allopathic treatment

Treatment of Hodgkin's lymphoma has become increasingly effective over the years. The type of treatment used for Hodgkin's depends on the information obtained by staging, and may include chemotherapy (treatment with a combination of drugs), and/or radiotherapy (treatment with radiation to kill cancer cells).

Both chemotherapy and radiation therapy have unfortunate side effects. Chemotherapy can result in **nausea**, **vomiting**, **hair loss**, and increased susceptibility to infection. Radiation therapy can cause **sore throat**, difficulty in swallowing, **diarrhea**, and growth abnormalities in children. Both forms of treatment, especially in combination, can result in sterility (the permanent inability to have offspring), as well as heart and lung damage. A 2003 study showed a link between radiation therapy for Hodgkin's disease and increased risk for later **breast cancer**. However, adding chemotherapy to

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the regimen decreased the chance for breast cancer, perhaps by inducing premature **menopause**.

Expected results

Hodgkin's is one of the most curable forms of cancer. Current treatments are quite effective, especially with early diagnosis. Children have a particularly high rate of cure from the disease, with about 75% still living cancer-free 20 years after their original diagnosis. Adults with the most severe form of the disease have about a 50% cure rate. In 2003, research noted that even after complete remission, some patients showed signs of thyroid dysfunction, most likely from the immune problems caused by Hodgkin's disease. They recommended thyroid examinations every year during follow-up of the disease.

Prevention

While Hodgkin's disease cannot be prevented, researchers continue to study risk factors for the disease. In 2003, a study showed a possible link between exposure to the **measles** virus around the time of **pregnancy** or birth. As research continues, these and other discoveries may help people control certain risk factors for Hodgkin's disease and other cancers.

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ORGANIZATIONS

The Lymphoma Research Foundation of America, Inc. 8800 Venice Boulevard, Suite 207, Los Angeles, CA 90034. (310) 204-7040. http://www.lymphoma.org.

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Holistic dentistry

Definition

Holistic dentistry, also referred to as biologic dentistry, is an alternative approach that focuses on the use of non-toxic restorative materials for dental work and emphasizes the unrecognized impact that dental toxins and dental **infections** may have on a person's overall health. While traditional dentistry focuses only on the areas above the neck, holistic dentistry looks at the patient as a whole system and how the mouth relates to the rest of the body.

Origins

Applying a biological concept to the practice of dentistry began in the late 1800s when the National Dental Association recognized the harmful effects of mercury (amalgam) fillings and mandated that members of the association not use these on their patients. As of 1997, this warning had been recognized and acted upon by several foreign countries that have either banned the use of mercury fillings or were in the process of doing so. Supporters of holistic dentistry state that mercury in amalgam fillings causes ill effects when placed as an implant in the body.

Further beginnings of holistic dentistry are linked to a 1925 article by dentist Weston A. Price (1870–1948). A former director of research for the American Dental Association, Price claimed in an article for the *Journal of the American Medical Association* that degenerative diseases such as heart troubles, kidney and bladder disorders, arthritis, rheumatism, mental illness, lung problems, and several kinds of bacterial infections arise from root canal therapy, or endodontics. To come to this conclusion, Price conducted research that involved implanting teeth from root canals of individuals with symptoms such as severe heart problems and kidney disease under the skin of healthy rabbits. These same conditions arose in the rabbits, and within three days they died. Price then implanted the same tooth in another rabbit and found a similar response, but he also found that implanting a normal extracted tooth did not affect the rabbits.

Price's root canal research became known as the "focal infection" theory and because of its popularity, it led to the extraction of millions of endodontically treated teeth. Further research conducted during the 1930s ridiculed Price's theory calling it invalid, ending the once-recommended extractions.

Price also maintained that sugar causes not only tooth decay but is responsible for physical, mental,

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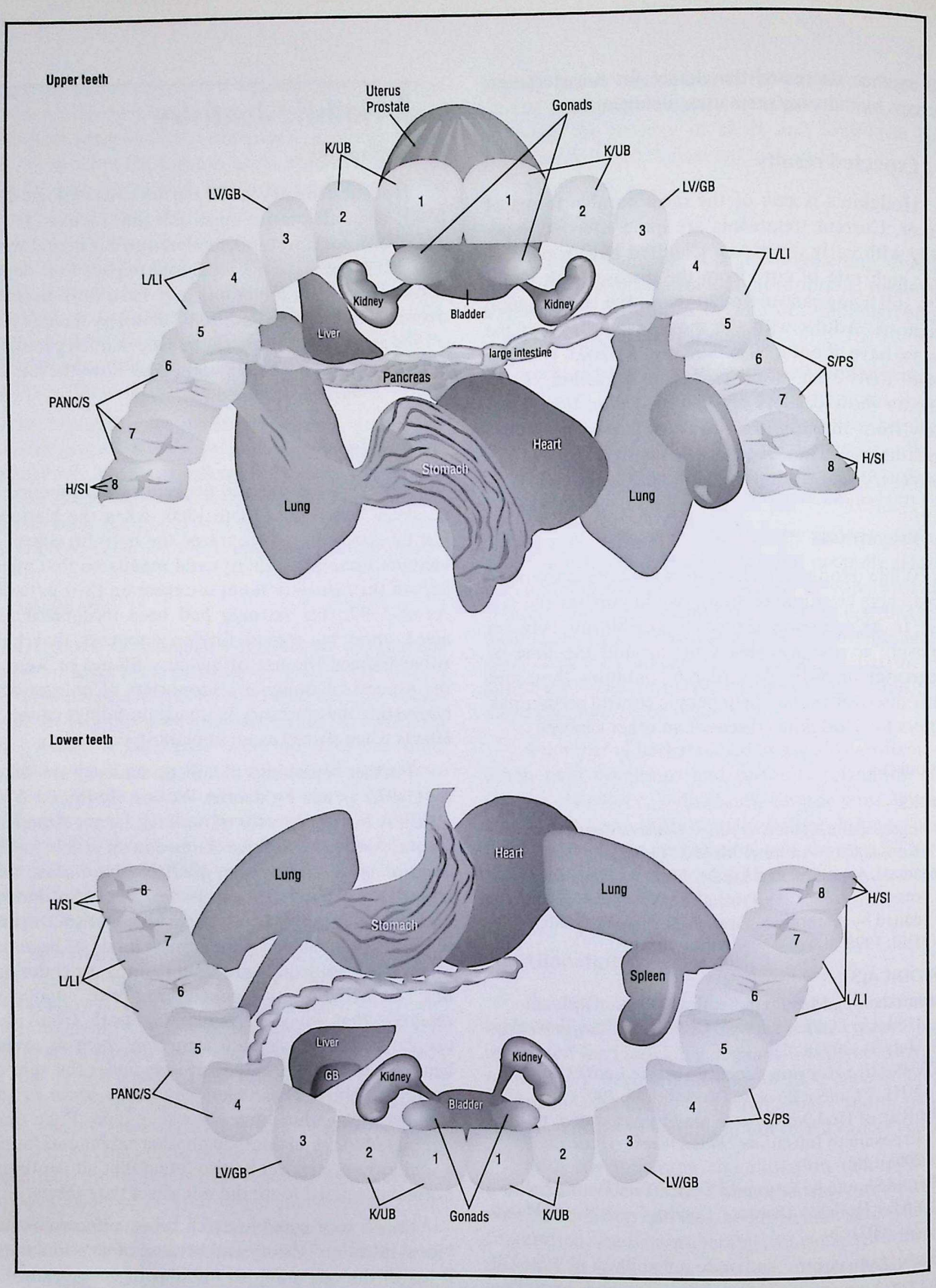

Acupuncture points of teeth that correspond to major organs. *(Illustration by GGS Information Services, Inc. Cengage Learning, Gale)*

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moral, and social decay. This judgment came about as he and anthropologist Francis Pottenger observed primitive areas throughout the world whose natives did not have cavities. Although concluding that the lack of sugar in their **diets** led to good oral health, critics have since pointed out that Price overlooked the fact that malnourished people do not typically get many dental cavities.

Support of Price's theories continued, especially from a dentist named Melvin Page. Page coined the phrase "balancing body chemistry" and considered tooth decay an "outstanding example of systemic chemical imbalances." In an attempt to aid these problems, Page marketed a mineral supplement with claims that widespread mineral deficiencies were an underlying cause of several health conditions, including goiter, heart trouble, **tuberculosis**, and diabetes. He also claimed that drinking cow's milk was unnatural and the underlying cause of colds, sinus infections, **colitis**, and cancer.There is no research supporting Price's statements, and his mineral supplement was never supported by the Federal Trade Commission (FTC).

The origins of holistic dentistry remain with Price's manuscripts and photographs at the Price-Pottenger **Nutrition** Foundation in La Mesa, California. Founded in 1965, the Foundation promotes nutrition, megavitamin therapy, **homeopathy**, and **chelation therapy**.

Founded in 1978, the Holistic Dental Association provides support to holistic dentists. Through a program of continuing education, the organization furthers the knowledge of alternative practices in dentistry. The International Academy of Biological Dentistry and Medicine supports the efforts of holistic dentists and medical doctors. The group was founded in 1985 by two California dentists and was renamed in 2005. Among its programs are professional educational seminars, presented to its members, covering topics related to holistic dentistry and medicine.

Since the late 1800s, supporters of holistic dentistry have continued to state their concerns regarding several procedures and recommendations of conventional dentistry, including the use of fluoride in drinking water and in teeth cleansers.

Benefits

Holistic dentistry is said to be an emerging new field of probiotic dental medicine—a type of medicine that supports the life process. Those who practice this form of biologic dentistry claim that it is aesthetic, relatively nontoxic, and individually biocompatible, or life supporting. A holistic dentist uses physiologic and electronic methods to locate areas of chronic disease that are difficult to locate by current standard methods.

The benefits of holistic dentistry are said to be the result of its incorporation of hypnosis, homeopathy, **aromatherapy**, nutrition, and herbology.

Hypnosis

When hypnosis is used, patients are able to relax their bodies and minds by concentrating on suggestions of **relaxation**. Patients are fully aware of what is happening during their treatment and no drugs are used. Many holistic dentists employ specialist hypnotherapists to provide treatment that is highly effective and cannot cause any harm or produce any side effects.

Homeopathy

Homeopathy is used by holistic dentists as a natural approach to their practice. The therapy is a safe and natural alternative that is nonaddictive and effective with both adults and children. Homeopathic remedies are used to improve the psychological or emotional condition of patients without the drugging effects of conventional tranquilizers. The three main remedies considered by holistic dentists are: **aconite** (**foxglove**); **gelsemium** (yellow jasmine); and *argentum nitricum* (silver nitrate).

Aromatherapy

Aromatherapy uses the pure oil essences from plants and flowers that act as hormone-like stimulants to improve a patient's health balance. Used because they are natural and gentle, oils such as **lavender**, bergamot, sandalwood, and basil are beneficial in their power to soothe, relax, and calm. Some holistic dentists use these oils to make their offices more inviting to patients.

Nutrition

Holistic dentists believe that **stress** and tension are often linked to diet. Dietary excesses or deficiencies increase the body's needs for essential vitamins and minerals, and the stress and tension accelerate any fears or **phobias** of the patient.

Botanical medicine & herbal medicine

Holistic dentistry may use herbs to promote relaxation. The sedative properties of **chamomile**, lime-flower, vervain, **rosemary**, and **valerian** are relied upon in place of conventional drugs.

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Holistic dentists may incorporate **acupuncture** and physical therapy into their use of clinical dentistry. The more modern sciences of **neural therapy**, hematology, immunology, and **electroacupuncture** may also be incorporated into a holistic dental practice.

Description

Biological dentistry's main concern is the toxicity of metals and their release from fillings and replacement appliances (such as metal partials and crowns that have nickel) used in dentistry. According to supporters of holistic dentistry, the metal ions separate from their original structures to diffuse, migrate to, and become absorbed in the tissues of the body, affecting the overall integrity of the immune system. An additional biological concern is what is called oral galvanism, or the direct electrical currents generated by separated metals throughout fluids and tissues in the body. Hidden or residual infection, or the abnormal changes in the soft connective tissue containing dental material that cannot be processed, is believed to cause local and general defenses that put the body in a continuous state of active conflict, often leading to chronic disease.

According to those who practice holistic dentistry, there may be several major types of dental problems that can cause illness or dysfunction in the body:

- silver (amalgam) fillings that typically contain 50% mercury silver
- root canals
- cavitations, or neuralgia-inducing cavitational osteonecrosis (NICO), a term coined by the oral pathologist J. E. Bouguot in the 1980s
- electro-oral galvanism from dissimilar metals
- temporomandibular joint syndrome (TMJ), a painful condition of the jaw and its supporting muscles used for chewing

The main goals of a holistic dentist are identifying areas that need treatment and providing treatment to patients that will not create stress. Holistic dentists work in conjunction with other healthcare providers to investigate whether a hidden infection of dental origin exists and whether it may be the source of or contributing factor to overall health problems. A biological approach to dentistry ensures the use of treatment and therapies that cause the least disturbance to the immune system. In order to determine the appropriate method of treatment, a holistic dentist must thoroughly review the patient's medical and dental background.

Preparations

While the method of biological dentistry varies for each holistic dentist, the keys to preparing their patients remain education and communication. Treatment is individualized.

A typical initial visit consists of an interview process, exam and x rays. Pictures of the patient's mouth are often collected with state-of-the-art equipment that uses film providing 50% less radiation than standard systems. The second meeting is typically called a Review of Findings appointment that educates the patient about the mouth and proactive treatment choices.

Precautions

Although proponents of holistic dentistry continue to increase, so do critics of these alternative methods. Believers in biologic dentistry claim that root canal-treated teeth cause NICO and other chronic systemic diseases and require removal of all these teeth and the healthy teeth surrounding them. Critics state that these extreme measures are bizarre and dangerous. According to a 1994 article in *Milwaukee Magazine*, a group of local patients filed suit against several holistic practitioners who had removed several of their perfectly healthy teeth after guaranteeing improvement of their diseases. These patients experienced no relief from their ongoing health problems after the extractions.

Side effects

Certain side effects have been reported as a result of treatments used by holistic dentists. Patients who were treated with **auriculotherapy**, or acupuncture of the ear, have experienced complications from unsterile needles.

When correcting a bad bite, holistic dentists often place a plastic appliance called a mandibular orthopedic repositioning appliance (MORA) between the teeth. The long-term use of MORAs has been reported to cause the patient's teeth to move out of proper alignment, leading to the need for orthodontics or facial reconstructive surgery to correct the deformity.

Since amalgam fillings are one of the main concerns of holistic dentists, many have turned to using nontoxic composite materials, but these too have come under scrutiny. The plastics used in the composites have been linked to leaching compounds that may be dangerous to health.

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KEY TERMS

Homeopathy—The principal known as like cures like, the use of minute quantities of remedies that if used in large doses would produce the effects of the disease being treated.

Mercury—A metallic element appearing as a silver-colored liquid at ordinary temperatures.

Probiotic—Favoring the support of life; related to promoting life and life conditions.

Toxins—Poisonous substances of animal or plant origin having a protein structure.

Research and general acceptance

While dentistry has been reportedly undergoing a quiet revolution with the emergence of holistic dentists, their complementary methods remain under criticism. The nutritional supplements they prescribe to balance the body chemistry and the methods holistic dentists use to reach their recommended treatment continually attract negative comments. Hair analysis, computerized dietary analysis, or blood chemistry screening tests are used by some practitioners as a basis for recommending supplements. Critics state that hair analysis is not a reliable tool for measuring the body's nutritional state, and computer analysis, while useful for determining the composition of a person's diet, is being used by dentists who may not be qualified to perform dietary counseling. Blood chemistry screenings are processed in laboratories, but while the results may indicate a normal reading, holistic dentists use a narrower range to read the results, indicating to patients that their bodies are out of balance and need treatment.

Although supportive research is limited regarding the alternative methods used by holistic dentists, advocates of the complementary treatment continue to grow. With the formation of the Holistic Dental Association in 1978, a shift to treating the entire patient's health needs emerged from dentists, dental hygienists, and healthcare practitioners from all fields who endorse these ideas.

Many of the medical services provided by holistic dentists are paid for by healthcare insurance in the United States (excluding HMOs and Medicare). Insurance typically pays for what is termed usual and customary treatments, such as laboratory tests, doctor visits, medical treatment, and x rays, but it will not cover experimental drugs.

Training and certification

Holistic dentists are those who have been trained as authorized practitioners of dentistry through a school of medicine acquiring a degree as a doctor of dental surgery (DDS). Their focus is one that combines conventional teachings with new, complementary methods to treat their patients' health needs.

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International Academy of Biological Dentistry and Medicine, 17222 Red Oak Dr., Ste. 101, Houston, TX, 77090, (281) 651-1745, http://www.iabdm.org.

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Holistic medicine

Definition

Holistic medicine is a term used to describe therapies that attempt to treat the patient as a whole person. That is, instead of treating an illness, as in orthodox allopathy, holistic medicine looks at an individual's overall physical, mental, spiritual, and emotional well-being before recommending treatment. A practitioner with a holistic approach treats the symptoms of illness as well as looking for the underlying cause of the

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illness. Holistic medicine also attempts to prevent illness by placing a greater emphasis on optimizing health. The body's systems are seen as interdependent parts of the person's whole being. The body's natural state is one of health, and an illness or disease is an imbalance in the body's systems. Holistic therapies tend to emphasize proper **nutrition** and avoidance of substances—such as chemicals—that pollute the body. Their techniques are noninvasive.

Some of the world's health systems that are holistic in nature include **naturopathic medicine**, **homeopathy**, and **traditional Chinese medicine**. Many alternative or natural therapies have a holistic approach, although that is not always the case. The term complementary medicine is used to refer to the use of both allopathic and holistic treatments. It is more often used in Great Britain, but is gaining acceptance in the United States.

There are no limits to the range of diseases and disorders that can be treated in a holistic way, as the principle of holistic healing is to balance the body, mind, spirit, and emotions so that the person's whole being functions smoothly. When an individual seeks holistic treatment for a particular illness or condition, other health problems improve without direct treatment due to improvement in the performance of the immune system, which is one of the goals of holistic medicine.

Origins

The concept of holistic medicine is not new. In the 4th century B.C. Socrates warned that treating one part of the body only would not have good results. Hippocrates considered that many factors contribute to the health or otherwise of a human being, including weather, nutrition, emotional factors. In our time, a host of different sources of pollution can interfere with health. And of course, holistic medicine existed even before ancient Greece in some older healing traditions, such as those from India and China, which date back over 5,000 years. However, the term "holistic" only became part of everyday language in the 1970s, when Westerners began seeking an alternative to allopathic medicine.

Interestingly, it was only at the beginning of the twentieth century that the principles of holistic medicine fell out of favor in Western societies, with the advent of major advances in what we now call allopathic medicine. Paradoxically, many discoveries of the twentieth century have only served to confirm many natural medicine theories. In many cases, researchers have set out to debunk holistic medicine, only to find that their research confirms it, as has been the case, for example, with many herbal remedies.

KEY TERMS

Detoxification—Treating the body in such a way that it eliminates poisons accumulated in the cells.

Healing crisis—An uncomfortable condition that occurs When the body begins to eliminates toxins at an accelerated rate.

Benefits

Many people are now turning to holistic medicine, often when suffering from chronic ailments that have not been successfully treated by allopathic means. Although many wonderful advances and discoveries have been made in modern medicine, surgery and drugs alone have a very poor record for producing optimal health because they are designed to attack illness. Holistic medicine is particularly helpful in treating chronic illnesses and maintaining health through proper nutrition and **stress** management.

Description

There are a number of therapies that come under the umbrella of "holistic medicine." They all use basically the same principles, promoting not only physical health, but also mental, emotional, and spiritual health. Most emphasize quality nutrition. Refined foods typically eaten in modern America contain chemical additives and preservatives, are high in fat, **cholesterol**, and sugars, and promote disease. Alternative nutritionists counter refinded foods by recommending whole foods whenever possible and minimizing the amount of meat—especially red meat—that is consumed. Many alternative therapies promote **vegetarianism** as a method of **detoxification**.

The aim of holistic medicine is to bring all areas of an individual's life, and most particularly the energy flowing through the body, back into harmony. Ultimately, of course, only the patient can be responsible for this, for no practitioner can make the necessary adjustments to diet and lifestyle to achieve health. The practice of holistic medicine does not rule out the practice of allopathic medicine; the two can complement each other.

A properly balanced holistic health regimen, which takes into consideration all aspects of human health and includes noninvasive and nonpharmaceutical healing

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methods, can often completely eradicate even acute health conditions safely. If a patient is being treated with allopathic medicine, holistic therapies may at least support the body during treatment, and alleviate the symptoms that often come with drug treatments and surgery. In addition, holistic therapies focus on the underlying source of the illness, to prevent recurrence.

Here are some of the major holistic therapies:

- herbal medicine
- homeopathy
- naturopathic medicine
- traditional Chinese medicine
- Ayurvedic medicine
- nutritional therapies
- chiropractic
- stress reduction
- psychotherapy
- massage.

Because holistic medicine aims to treat the whole person, holistic practitioners sometimes may advise treatment from more than one type of practitioner. This precaution ensures that all aspects of health are addressed. Some practitioners also specialize in more than one therapy and so may be able to offer more comprehensive assistance.

Preparations

To choose a holistic practitioner, a person should consider the following questions:

- How did you hear of this therapist? A personal referral can sometimes be more reliable than a professional one. What do other professionals say about this therapist? What qualifications, board certification, or affiliations does this practitioner have?
- How do you feel personally about this practitioner? Do you feel comfortable in his/her office and with his/her staff? Is your sense of well being increased? Are you kept waiting for appointments?
- Do you have confidence in this practitioner, does he/she respect you as a person? Does he/she show an interest in your family, lifestyle, and diet? Are various treatment options explained to you?
- Is your personal dignity respected?
- Do you feel that this practitioner is sensitive to your feelings and fears regarding treatment?
- Is this practitioner a good advertisement for his/her profession? Signs of stress or ill health may mean that you would be better off choosing another practitioner.
- Do you feel that you are rushed into decisions, or do you feel that you are allowed time to make an informed choice regarding treatment?
- Are future health goals outlined for you? And do you feel that the practitioner is taking your progress seriously?
- Do you feel unconditionally accepted by this practitioner?
- Would you send your loved ones to this practitioner?

If you answered yes to all the above, then you have found a suitable practitioner. The cost of treatment by a holistic therapist varies widely depending on the level of qualification and the discipline, so it is best to discuss how much treatment can be expected to cost with a practitioner before beginning a course of therapy. Some forms of holistic treatment may be covered by health insurance.

Precautions

Many people who try holistic therapies focus on one area of their health only, often detoxification and nutrition. However, practitioners stress that it is only when all areas of a person's potential well-being are tackled that total health and happiness can be achieved. They stress that the spiritual and emotional health contribute just as much as physical and mental health to a person's overall state of well-being.

When seeking treatment from a holistic practitioner, it is important to ensure that they are properly qualified. Credentials and reputation should always be checked. In addition, it is important that allopathic physicians and alternative physicians communicate with one another about a patient's care.

Side effects

One of the main advantages of holistic therapies is that they have few side effects when used correctly. If a reputable practitioner is chosen, and guidelines are adhered to, the worst that typically happens is that when lifestyle is changed, and fresh nutrients are provided, the body begins to eliminate toxins that may have accumulated in the cells over a lifetime.

Often holistic therapy results in what is known in alternative medicine circles as a "healing crisis." This comes about when the cells eliminate poisons into the blood stream all at the same time, throwing the system into a state of toxic overload until it can clear the "backlog." Symptoms such as **nausea**, headaches, or sensitivities to noise and other stimulations may be experienced.

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The answer to most patients who are otherwise healthy patients is often just to lie quietly in a darkened room and take herbal teas. However, in the case of someone who has a serious illness, such as arthritis, **colitis**, diabetes, or **cancer**, it is strongly advised that they seek the help of a qualified practitioner. Therapists can help patients achieve detoxification in a way that causes the least stress to their bodies.

Research and general acceptance

Traditionally, holistic medicine, in all its different forms, has been regarded with mistrust and skepticism on the part of the allopathic medical profession. This situation is gradually changing. As of 2008, many insurance companies will provide for some form of alternative, or complementary treatment.

In addition, many allopathic physicians, recognizing the role alternative medicine can play in overall health and well being, are actually referring patients to reputable practitioners, particularly chiropractors and **relaxation** therapists, for help with a varied range of complaints.

Training and certification

Holistic or alternative medicine practitioners are usually affiliated with an organization in their field. Training varies widely with the category, and ranges from no qualifications at all—experience only—to holding a Ph.D. from an accredited university. Again, credentials and memberships should be checked by prospective patients.

An excellent source for qualified practitioners is the American Board of Holistic Medicine (AHBM), which was incorporated in 1996. Also, the American Holistic Medicine Association has a comprehensive list of practitioners in all types of therapies across the United States, which they call "the holistic doctor finder." However, these groups stress that it is the responsibility of the patient to check each practitioner's credentials prior to treatment.

The ABHM has established the core curriculum upon which board certification for holistic medicine will be based. It includes the following twelve categories:

Body

Physical and environmental health

- nutritional medicine
- exercise medicine
- environmental medicine

Mind

Mental and emotional health

- behavioral medicine

Spirit

Spiritual health

- spiritual attunement
- social health

The six specialized areas:

- biomolecular diagnosis and therapy
- botanical medicine
- energy medicine
- ethnomedicine—including traditional Chinese medicine, Ayurveda, and Native American medicine
- homeopathy
- manual medicine

Founded in 1978 for the purpose of uniting practitioners of holistic medicine, membership of the AHMA is open to licensed medical doctors (MDs) and doctors of osteopathic medicine (DOs) from every specialty, and to medical students studying for those degrees. Associate membership is open to health care practitioners who are certified, registered or licensed in the state in which they practice. The mission of the AHMA is to support practitioners in their personal and professional development as healers, and to educate physicians about holistic medicine.

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Patricia Skinner

Holy thistle *see* **Blessed thistle**

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Homeopathy

Definition

Homeopathy, or homeopathic medicine, is a holistic system of treatment that originated in the late eighteenth century. The name homeopathy is derived from two Greek words that mean "like disease." The system is based on the idea that substances that produce symptoms of sickness in healthy people will have a curative effect when given in very dilute quantities to sick people who exhibit those same symptoms. Homeopathic remedies are believed to stimulate the body's own healing processes. Homeopaths use the term "allopathy," or

Homeopathic remedies

Name	Description
Aconite	Commonly known as monkshood, aconite is highly toxic. A nontoxic, diluted extract of aconite is used in homeopathy to treat symptoms similar to that of poison.
Allium cepa	Commonly known as red onion, homeopathic physicians use a dilute extract of red onion to treat symptoms similar to that of hay fever - watery eyes, burning, etc.
Apis	Commonly known as the honeybee, apis as a homeopathic remedy is made from the body of the bee. It is used to treat symptoms similar to that of a bee sting - redness, swelling, etc.
Arnica	Commonly known as the mountain daisy, arnica is used by homeopathic physicians as an ingredient in anti-inflammatory preparations, mainly to treat bruises, sprains, and strains.
Arsenicum album	Also known as *ars alb*, *arsenicum album* is a diluted form of arsenic, a metallic poison. It is used by homeopathic physicians to treat symptoms similar to the effects of arsenic poisoning - dehydration, burning pain, etc.
Belladonna	Commonly known as deadly nightshade, belladonna is used in homeopathy to treat symptoms of dry mouth, nausea, delirium, etc., and is also thought to be an anti-spasmodic.
Bryonia	Commonly known as wild hops, bryonia is used in homeopathy to treat vomiting, diarrhea, inflammation, etc.
Calcarea carbonica	Also known as calcium carbonate or *calc carb*, it is used in homeopathy to treat symptoms of exhaustion, depression, and anxiety.
Cantharis	Commonly known as Spanish fly, cantharis is used in homeopathy to treat conditions with symptoms of abdominal cramps, vomiting, diarrhea, convulsions, etc.
Chamomilla	Derived from German chamomile, it is used in homeopathy to treat irritability, impatience, etc. It is most often prescribed to children.
Ferrum phosphoricum	Also known as *ferrum phos* or iron phosphate, it is used to treat symptoms of low energy and anemia.
Gelsemium	Also known as yellow jasmine, it is used to treat conditions that affect vision, balance, thought, and locomotion.
Hepar sulphuris	Derived from the inner layer of oyster shells, *hepar sulphuris* is used to treat infection.

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Homeopathic remedies (CONTINUED)

Name	Description
Hypericum	Commonly known as St. John's wort, hypericum has historically been used to treat nerve damage and mental disorders, and is often used today to treat depression, anxiety, and sleep disorders.
Ignatia	Derived from seeds of a tree native to the Philippines, this homeopathic remedy is prescribed to treat conditions with symptoms such as headache, cramping, tremors, and nervous complaints.
Ipecac	Ipecac induces vomiting and causes gastrointestinal distress. Homeopaths prescribe it to treat similar symptoms.
Kali bichromicum	Commonly known as potassium bichromate, *kali bichromicum* is a poison used in textile dyes, wood stain, etc., as well as an oxidizing agent in photography. Homeopaths use it to treat localized pain.
Lachesis	Derived from the venom of the bushmaster snake, this homeopathic remedy is used to treat conditions that cause the same symptoms as the venom itself, which can include delirium tremen, tension and constriction, pressure, or even paralysis.
Ledum	Also known as marsh tea, ledum is used to treat infections, most often from animal bites, stings, cuts, etc.
Lycopodium	Commonly known as club moss, lycopodium is used to treat diarrhea, digestive upset, etc.
Mercurius vivus	Also known as quicksilver, it is used to treat symptoms of sweats, shaking, nausea, etc.
Natrum muriaticum	Commonly known as salt, it is used to treat conditions that cause excessive thirst and salt cravings.
Nux vomica	It is used to treat symptoms caused by overeating and too much caffeine or alcohol.
Phosphorus	It is used to treat symptoms of excessive thirst, fatigue, and nervousness.
Pulsatilla	It is used to treat conditions that are accompanied by discharge, such as bedwetting, sinusitis, etc.
Rhus toxicodendron	Commonly known as poison ivy, homeopaths use it to treat conditions with symptoms of fever, swollen glands, and restlessness.
Ruta	It is used to treat conditions with joint pain and tenderness and with bruising, such as tennis elbow, sciatica, etc. Also used to treat certain problems of the eyes and uterus, such as eyestrain and menstrual pain.
Sepia	Sepia is the discharge used by the cuttlefish to disappear from a predator. Homeopaths use sepia to treat symptoms of apathy and weakness.
Silica	Also called flint, silica is used by homeopaths to treat conditions that cause weakness, sweating, and sensitivity to cold.
Sulphur	It is used to treat conditions with symptoms of itching, burning pains, and odor.

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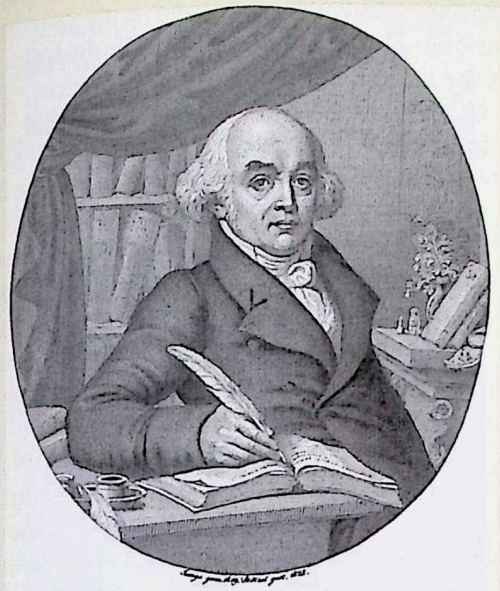
SAMUEL HAHNEMANN (1755–1833)



SAMUEL HAHNEMANN, M.D.

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Samuel Christian Hahnemann created and developed the system called homeopathy. It is also known as *similia similibus curentor* or like cures like. Although his new methods initially met with ridicule and criticism, by the time of his death they were accepted the world over as a result of the great success he had with his new cure.

Hahnemann was born in Meissen, Saxony (now part of Germany) into a financially challenged middle class family. His parents initially educated him at home, where his father taught him never to accept anything he learned without first questioning it. He graduated as a physician at Erlangen in 1779 after studying at Leipzig and Vienna. He was also fluent in English, German, Italian, French, Greek, Arabic, Latin and Hebrew.

At age 27 he married his first wife, Johanna Henriette Kuchler, the daughter of an apothecary, with whom he had 11 children.

Living in poverty, Hahnemann began practicing medicine in 1781 and translating scientific texts to supplement his income. However, disillusioned with medicine, he eventually gave it up entirely.

He discovered the concept of homeopathy when considering the effect of quinine on malaria, and went on to cure soldiers and then sufferers of a typhus epidemic with astounding success. He documented his discoveries in the *Organon*, a treatise on his work. Homeopathy also proved it's worth in 1831 when there was an outbreak of cholera. Hahnemann used homeopathic treatment with a 96% success rate, compared to the 41% of allopathic medicine. He also wrote his *Materia Medica Pura.*

In 1834, Hahnemann met his second wife, Marie Melanie d'Hervilly. Despite a great difference in age, they were happily married until his death in Paris on July 2, 1843, at the age of 88.

"different disease," to describe the use of drugs used in conventional medicine to oppose or counteract the symptom being treated.

Origins

Homeopathy was founded by the German physician Samuel Hahnemann (1755-1843), who was much disturbed by the medical system of his time, believing that its cures were crude and some of its strong drugs and treatments did more harm than good to patients. Hahnemann performed experiments on himself using Peruvian bark, which contains quinine, a **malaria** remedy. He concluded that in a healthy person, quinine creates the same symptoms as malaria, including fevers and **chills**, which is the reason why it is effective as a remedy. He then began to analyze the remedies available in nature by what he called provings. Provings of homeopathic remedies are still compiled by dosing healthy adults with various substances and documenting the results, in terms of the dose needed to produce the symptoms and the length of the dose's effectiveness. The provings are collected in large homeopathic references called *materia medica* or materials of medicine.

Hahnemann formulated these principles of homeopathy:

- Law of Similars (like cures like)
- Law of the Infinitesimal Dose (The more diluted a remedy is, the more potent it is.)
- Illness is specific to the individual.

Hahnemann's Law of Similars was based on thinking that dated back to Hippocrates in the fourth century B.C. It is the same thinking that provided the basis for the vaccines discovered by Edward Jenner and Louis Pasteur. These vaccines provoke a reaction in the individual that protects against the actual disease. Allergy treatments work the same way. By

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KEY TERMS

Aggravation—Temporary increase in symptoms due to homeopathic remedy.

Antidote—Substance which cancels the effect of homeopathic remedies

Homeopath—A homeopathic physician.

Proving—Case study of the effect of a homeopathic medicine.

Repertory—Reference manual of homeopathic remedies.

Vital force—Innate wisdom and energy of the body.

exposing a person to minute quantities of the allergen, the person's tolerance levels are elevated.

The Law of the Infinitesimal Dose has always caused controversy among those outside the field of homeopathy. Hahnemann contended that as he diluted his remedies with water and alcohol and succussed, or shook, them, the remedies actually worked more effectively. In fact, diluted homeopathic remedies may have no chemical trace of the original substance. Practitioners believe that the electromagnetic energy of the original substance is retained in the dilution, but the toxic side effects of the remedy are not. It is this electrochemical "message" that stimulates the body to heal itself.

Homeopathic practitioners believe that illness is specific to an individual. In other words, two people with severe headaches may not receive the same remedies. The practitioner will ask the patient questions about lifestyle, dietary habits, and personality traits, as well as specific questions about the nature of the **headache** and when it occurs. This information gathering is called profiling or case-taking.

In the early 1900s, homeopathy was popular in America, with over 15 percent of all doctors being homeopaths. There were 22 major homeopathic medical schools, including Boston University and the University of Michigan. However, with the formation of the American Medical Association, which restricted and closed down alternative practices, homeopathy declined for half a century. When the 1960s revived back-to-nature trends and distrust of artificial drugs and treatments, homeopathy began to grow again dramatically through the next decades. In 1993, *The New England Journal of Medicine* reported that 2.5 million Americans used homeopathic remedies and 800,000 patients visited homeopaths in 1990, and homeopathy has continued to grow. Homeopathy is much more popular in Europe than in the United States. French pharmacies are required to make homeopathic remedies available along with conventional medications. Homeopathic hospitals and clinics are part of the national health system in Britain. Homeopathy is also practiced in India and Israel, among other countries.

Benefits

Homeopathic physicians seek to cure their patients on the physical, mental and emotional levels, and each treatment is tailored to a patient's individual needs. Homeopathy is generally a safe treatment, as it uses medicines in extremely diluted quantities, and there are usually minimal side effects. Its nontoxicity makes some consider it a good choice for the treatment of children. Another benefit of homeopathy is the cost of treatments; homeopathic remedies are inexpensive, often a fraction of the cost of conventional drugs.

Homeopathic treatment has been shown to be effective in treating many conditions. Colds and flu may be effectively treated with **aconite** and **bryonia**. **Influenza** sufferers in a double-blind study found that they were twice as likely to recover in 48 hours when they took homeopathic remedies. Studies have been published in British medical journals confirming the efficacy of homeopathic treatment for **rheumatoid arthritis**. Homeopathic remedies are considered effective in treating **infections**, circulatory problems, respiratory problems, **heart disease**, **depression** and nervous disorders, migraine headaches, **allergies**, arthritis, and diabetes. Homeopathy is a treatment to explore for acute and chronic illnesses, particularly if these are found in the early stages and where there is not severe damage. Homeopathy can be used to assist the healing process after surgery or chemotherapy.

Description

A visit to a homeopath is usually a different experience from a visit to a regular physician. Surveys have shown that homeopathic doctors spend much more time during initial consultations than conventional doctors spend. This is because a homeopath does a thorough case-taking to get a complete picture of a person's general health and lifestyle, as well as particular symptoms, on the physical, mental and emotional levels. Some symptoms can be so subtle that the patient is not always completely aware of them, and the doctor must spend time getting to know the patient.

The initial visit often includes a long questionnaire about a patient's medical and family history,

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and then a long interview with the doctor, who prompts the patient with many questions. Sometimes a homeopathic doctor will use lab tests to establish a patient's general level of health. The initial interview usually lasts between one and two hours.

The purpose of homeopathy is the restoration of the body to homeostasis, or healthy balance, which is its natural state. The symptoms of a disease are regarded as the body's own defensive attempts to correct its imbalance, rather than as enemies to be defeated. Because a homeopath regards symptoms as positive evidence of the body's inner intelligence, he or she will prescribe a remedy designed to stimulate this internal curative process rather than suppress the symptoms.

In homeopathy, the curative process extends beyond the relief of immediate symptoms of illness. Healing may come in many stages, as the practitioner treats layers of symptoms that are remnants of traumas or chronic disease in the patient's past. The stages are related to Hering's Laws of Cure, named for Constantine Hering, the father of homeopathy in America. Hering believed that healing starts from the deepest parts of the body to the extremities, and from the upper parts of the body to the lower parts. Hering's Laws also state that homeopaths should treat disease symptoms in reverse chronological order, from the most recent to the oldest, restoring health in stages. Sometimes, the patient may feel worse before feeling better. This temporary worsening is called a healing crisis.

When prescribing a remedy, homeopaths will match a patient's symptoms with the proper remedy in a repertory or *materia medica* that has been compiled throughout the history of homeopathy. Classical homeopaths prescribe only one remedy at a time. However, it is becoming more common, especially in Europe, to use combination formulas of several remedies for the treatment of some combinations of symptoms.

The cost of homeopathic care can vary. The cost of visits will be comparable to conventional medicine, with initial visits ranging from $50 to $300. Non-M.D. homeopaths can charge from $50 to $250. Follow-up visits are less, at about $35 to $100. Homeopathic medicine is significantly cheaper than pharmaceuticals, and most remedies cost between $2 and $10. Some doctors provide remedies without charge. Homeopaths rarely use lab tests, which reduces the cost of treatment further. In general, homeopathy is much more economical than conventional medicine. In 1991, the French government did a study on the cost of homeopathic medicine, and found that it costs half as much to treat patients, considering all costs involved.

When homeopaths are licensed professionals, most insurance companies will pay for their fees. Consumers should consult their insurance policies to determine individual regulations. Insurance usually will not cover homeopathic medicine, because it is sold over-the-counter.

Precautions

Although homeopathic remedies sometimes use substances that are toxic, they are diluted and prescribed in nontoxic doses. Remedies should be prescribed by a homeopathic practitioner. Those preparing to take homeopathic remedies should also avoid taking antidotes, which are substances that homeopathic doctors believe cancel the effects of their remedies. These substances include alcohol, coffee, prescription drugs, **peppermint** (in toothpaste and mouthwash), camphor (in salves and lotions), and very spicy foods. Homeopathic medicine should also be handled with care, and should not be touched with the hands or fingers, which may contaminate it.

Side effects

A homeopathic aggravation sometimes occurs during initial treatment with homeopathic remedies. This term means that symptoms can temporarily worsen during the process of healing. Although this is usually mild, the aggravation can sometimes be severe. Homeopaths see aggravation as a positive sign that the remedy is a good match for the patient's symptoms. The healing crisis, which happens when the patient is undergoing treatment for layers of symptoms, may also cause the patient to feel worse before feeling better. Some patients can experience emotional disturbances like weeping or depression, if suppressed emotional problems led to the illness in the first place.

Research and general acceptance

Since the early 1900s, when the American Medical Association and pharmacists waged a battle against it, homeopathy has been neglected and sometimes ridiculed by mainstream medicine. Aside from politics, part of the reason for this hostility is that there are some aspects of homeopathy that have not been completely explained scientifically. For instance, homeopaths have found that the more they dilute and succuss a remedy, the greater effect it seems to have on the body. Some homeopathic remedies are so diluted that not even a single molecule of the active agent remains in a solution, yet it still works; studies have demonstrated this paradox, yet can't explain it. Also, homeopathy puts an emphasis on analyzing symptoms and then applying remedies to these symptoms, rather than

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working by classifying diseases. Thus, some people with the same disease may require different homeopathic medicines and treatments. Furthermore, conventional medicine strives to find out how medicines work in the body before they use them; homeopathy is less concerned with the intricate biochemistry involved than with whether a remedy ultimately works and heals holistically. For all these reasons, conventional medicine claims that homeopathy is not scientific, but homeopaths are quick to reply that homeopathy has been scientifically developed and studied for centuries, with much documentation and success.

There continue to be many studies that affirm the effectiveness of homeopathic treatments. Among the most celebrated, the *British Medical Journal* in 1991 published a large analysis of homeopathic treatments that were given over the course of 25 years. This project involved more than 100 studies of patients with problems ranging from vascular diseases, respiratory problems, infections, stomach problems, allergies, recovery from surgeries, arthritis, trauma, psychological problems, diabetes, and others. The study found improvement with homeopathic treatment in most categories of problems, and concluded that the evidence was "sufficient for establishing homeopathy as a regular treatment for certain indications."

For example, a study in early 2002 was reported on in a pediatric journal that showed symptom improvement for children with uncomplicated acute otitis media (**ear infection**) who received individualized homeopathic remedies. Although the authors concluded that more research was needed, results were positive enough to justify a larger study.

Training and certification

The Council on Homeopathic Education is the only organization that accredits training programs in classical homeopathy. To date, it has accredited five institutions: Bastyr University of Natural Health Sciences in Seattle, Ontario College of **Naturopathic Medicine** in Toronto, Hahnemann Medical Clinic in Albany, California, the National College of Naturopathic Medicine in Portland, and the International Foundation for Homeopathy, also in Seattle. Other well-known training programs include the Pacific Academy of Homeopathic Medicine in Berkeley, California, and the New England School of Homeopathy in Amherst, Massachusetts.

There are several organizations that certify homeopathic practitioners:

- The National Center for Homeopathy is the largest homeopathic organization, with more than 7,000 members. It also runs the Council on Homeopathic Education, and provides a listing of all its members and their credentials. Address: 801 N. Fairfax St., #306, Alexandria, VA 22314, phone (703) 548-7790.
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- The Council for Homeopathic Certification was created in 1992 to establish a certification exam and a code of ethics. It confers upon qualified practitioners a C.C.H. (Certification in Classical Homeopathy). Address: P.O. Box 157, Corte Madera, CA 94976.
- The Homeopathic Academy of Naturopathic Physicians offers a certification based on a competency exam, the "Diplomate in the Homeopathic Academy of Naturopathic Physicians" (D.H.A.N.P.).
- The North American Society of Homeopaths certifies non-physician homeopaths. Address: 10700 Old County Rd. 15, #350, Minneapolis, MN 55441, phone (612) 593-9458.

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Homeopathy, acute prescribing

Definition

Acute homeopathic prescribing is that part of **homeopathy** that treats illnesses of abrupt onset requiring immediate attention. In homeopathic medicine, acute refers primarily to the speed of onset and self-limiting character of the disorder rather than its seriousness. Colds, **influenza**, sore throats, insect **stings**, **cuts**, **bruises**, **vomiting**, **diarrhea**, **fever**, muscle aches, and short-term **insomnia** are all examples of conditions that are treated by acute prescribing. The remedies given in acute homeopathic prescribing are intended to stimulate the body's internal ability to heal itself; they do not kill germs or suppress symptoms. Acute prescribing can be done—within limits—by patients at home, as well as by homeopathic practitioners. Study courses, self-treatment guides, and homeopathic home medicine kits are now available by mail order from homeopathic pharmacies and educational services.

Origins

Homeopathy is a gentle, painless, holistic system of healing developed during the 1790s by Samuel Hahnemann, a German physician. Experimenting on himself with the anti-malarial drug quinine, Hahnemann noticed that large doses of the medicine actually caused malaria-like symptoms, while smaller doses cured the symptoms. From this, he advanced his concept of *Similia similibus curentur*, or "let like be cured with like." Hahnemann then developed an extensive system of medicine based on this concept. He named it homeopathy, from the Greek words *homoios* (the same) and *pathos* (suffering).

Homeopathic remedies are almost always made from natural materials—plant, animal, or mineral substances—that have been treated to form mother tinctures or nonsoluble powders. Liquid extracts are then potentized, or increased in power, by a series of dilutions and succussions, or shakings. It is thought that succussion is necessary to transfer the energy of the natural substance to the solution. In addition, the potency of the remedy is regarded as increasing with each dilution. After the tincture has been diluted to the prescribed potency, the resulting solution is added to a bottle of sucrose/lactose tablets, which are stored in a cool, dark place. If the remedy is not soluble in water, it is ground to a fine powder and triturated with powdered lactose to achieve the desired potency.

KEY TERMS

Acute prescribing—Homeopathic treatment for self-limiting illnesses with abrupt onset.

Allopathy—Conventional medical treatment of disease symptoms that uses substances or techniques to oppose or suppress the symptoms.

Law of similars—The basic principle of homeopathic medicine that governs the selection of a specific remedy. It holds that a substance of natural origin that produces certain symptoms in a healthy person will cure those same symptoms in a sick person.

Modalities—The factors and circumstances that cause a patient's symptoms to improve or worsen.

Mother tincture—The first stage in the preparation of a homeopathic remedy, made by soaking a plant, animal, or mineral product in a solution of alcohol.

Potentization—The process of increasing the power of homeopathic preparations by successive dilutions and succussions of a mother tincture.

Succussion—The act of shaking diluted homeopathic remedies as part of the process of potentization.

Trituration—The process of diluting a nonsoluble substance for homeopathic use by grinding it to a fine powder and mixing it with lactose powder.

Proponents of homeopathy over the years have included Louisa May Alcott, Charles Dickens, Benjamin Disraeli, Johann Wolfgang Goethe, Nathaniel Hawthorne, William James, Henry Wadsworth Longfellow, Pope Pius X, John D. Rockefeller, Harriet Beecher Stowe, William Thackeray, Daniel Webster, and W. B. Yeats. England's royal family has employed homeopathic practitioners since the 1830s.

Benefits

Homeopathic physicians seek to cure their patients on physical, mental, and emotional levels, and each treatment is tailored to a patient's individual needs. Homeopathy is generally a safe treatment, as it uses medicines in extremely diluted quantities, and there are usually minimal side effects. Its non-toxicity makes it a good choice for the treatment of children. Another benefit of homeopathy is the cost of treatments; homeopathic remedies are inexpensive, often a fraction of the cost of conventional drugs.

Acute homeopathic prescribing is thought to benefit a wide range of ailments. These include altitude sickness, Bell's palsy, the **common cold**, **allergies**,

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coughing, dengue fever, dysentery, earaches, migraine headaches, fever, **food poisoning**, grief, influenza, **motion sickness**, shock, **sore throat**, surgical complications, and reactions to vaccinations and drug therapy. Acute remedies may also be prescribed for treat insect stings, animal **bites**, and problems related to poison **oak** and poison ivy. It may be further employed in treating injuries including black eyes, **burns**, bruises, concussions, cuts, damaged tendons and ligaments, dislocations, **fractures**, herniated discs, **nosebleeds**, puncture **wounds**, **sprains**, and **strains**.

Description

Homeopathic prescribing differs in general from allopathic medicine in its tailoring of remedies to the patient's overall personality type and totality of symptoms, rather than to the disease. Whereas a conventional physician would prescribe the same medication or treatment regimen to all patients with the common cold, for example, a homeopathic practitioner would ask detailed questions about each patient's symptoms and the modalities, or factors, that make them better or worse. As a result, the homeopath might prescribe six different remedies for six different patients with the same illness. In acute prescribing homeopathy, consultations are more brief compared to constitutional homeopathic prescribing. A typical patient might spend just 10–15 minutes with the practitioner, compared to more than an hour for constitutional prescribing.

Homeopathic classification of symptoms

Homeopathic practitioners use the word symptom in a more inclusive fashion than traditional medicine. In homeopathy, symptoms include any change that the patient experiences during the illness, including changes in emotional or mental patterns.

Homeopaths classify symptoms according to a hierarchy of four categories for purposes of acute prescribing:

- Peculiar symptoms. These are symptoms unique to the individual that do not occur in most persons with the acute disease. Homeopaths make note of peculiar symptoms because they often help to determine the remedy.
- Mental and emotional symptoms. These are important general symptoms that inform the homeopath about the patient's total experience of the disorder.
- Other general symptoms. These are physical symptoms felt throughout the patient's body, such as tiredness, changes in appetite, or restlessness.
- Particular symptoms. Particular symptoms are localized in the body; they include such symptoms as nausea, skin rashes, headache, etc.

During homeopathic case-taking, the practitioner will evaluate the intensity of the patient's symptoms, assess their depth within the patient's body, note any peculiar symptoms, evaluate the modalities of each symptom, and make a list of key symptoms to guide the selection of the proper medicine.

Homeopathic remedies

There are several hundred homeopathic remedies. Homeopathic medicines are usually formulated from diluted or triturated natural substances, including plants, minerals, or even venom from snakes or stinging insects. Some remedies may be given in a spray, ointment, or cream, but the most common forms of administration are liquid dilutions and two sizes of pellets, or cylindrical tablets (for triturated remedies). A dose consists of one drop of liquid; 10–20 small pellets; or 1–3 large pellets. Since the remedies are so dilute, the exact size of the dose is not of primary importance. The frequency of dosing is considered critical, however; patients are advised not to take further doses until the first has completed its effect.

Homeopathic remedies can be kept indefinitely with proper handling. Proper handling includes storing the remedies in the original bottles and discarding them if they become contaminated by sunlight or other intense light; temperatures over 100°F (37.8°C); vapors from camphor, mothballs, or perfume; or from other homeopathic remedies being opened in the same room at the same time.

Preparations

Case-taking

The first step in acute prescribing is a lengthy interview with the patient, known as case-taking. In addition to noting the character, location, and severity of the patient's symptoms, the homeopath will ask about their modalities. The modalities are the circumstances or factors (e.g., weather, time of day, body position, behavior or activity, etc.) that make the symptoms either better or worse. Case-taking can be done by the patient or a family member as well as by a homeopath.

Selection and administration of a remedy

The choice of a specific remedy is guided by the patient's total symptom profile rather than by the illness. Homeopathic remedies are prescribed according

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to the law of similars, which holds that a substance that produces specific symptoms in healthy people cures those symptoms in sick people when given in highly diluted forms. For example, a patient with influenza who is irritable, headachy, and suffering from joint or muscle pains is likely to be given *bryonia* (wild **hops**), because this plant extract would cause this symptom cluster in a healthy individual.

Patients are instructed to avoid touching homeopathic medicines with their fingers. The dose can be poured onto a piece of white paper or the bottle's cap and tipped directly into the mouth. Homeopathic remedies are not taken with water; patients should not eat or drink anything for 15–20 minutes before or after taking the dose.

Precautions

Homeopathic acute prescribing is not recommended for the treatment of chronic conditions requiring constitutional prescribing, for severe **infections** requiring antibiotic treatment, or for conditions requiring major surgery. It is also not recommended for the treatment of mental health problems.

Persons who are treating themselves with homeopathic remedies should follow professional guidelines regarding the limitations of home treatment. Most homeopathic home treatment guides include necessary information regarding symptoms and disorders that require professional attention.

Homeopathic remedies may lose their potency if used at the same time as other products. Some homeopathic practitioners recommend the avoidance of mint and mentholated products (toothpastes, candies, chewing gum, mouth rinses), as well as camphor and camphorated products (including **eucalyptus** and Tiger Balm), patchouli and other **essential oils**, moth balls, strong perfumes, aftershaves, scented soaps, **stress**, x rays, coffee, nicotine, recreational drugs (**marijuana**) and certain therapeutic drugs (most notably cortisone and prednisone) during treatment. Patients are also advised to avoid electric blankets and dental work, as these are thought to adversely affect homeopathic therapy. Homeopathic remedies should never be placed near magnets.

Practitioners caution that high-potency preparations should be used only under the supervision of a homeopathic practitioner.

Side effects

Homeopathic medicines are so diluted that sometimes no trace of the original substance can be detected. These medicines are therefore considered non-toxic and generally free of harmful side effects. There may, however, be individual reactions to homeopathic medicine.

An intensified healing response may occur as treatment begins, which causes symptoms to worsen, but the phenomenon is temporary. In some patients, old symptoms may reappear from past conditions from which recovery was not complete. Such phenomena are taken as positive indications that the healing process has commenced.

Research and general acceptance

As Samuel Hahnemann's healing system grew in popularity during the 1800s, it quickly attracted vehement opposition from the medical and apothecary professions. Since the early 1900s, when the American Medical Association and pharmacists waged a battle against it, homeopathy has been neglected and sometimes ridiculed by mainstream medicine. Aside from politics, part of the reason for this hostility is that there are some aspects of homeopathy which have not been completely explained scientifically. For instance, homeopaths have found that the more they dilute and succuss a remedy, the greater effect it seems to have on the body. Some homeopathic remedies are so diluted that not even a single molecule of the active agent remains in a solution, yet homeopaths maintain it still works. Also, homeopathy puts an emphasis on analyzing symptoms and then applying remedies to these symptoms, rather than working by classifying diseases. Thus, some people with the same disease may require different homeopathic medicines and treatments. Furthermore, conventional physicians strive to find out how medicines work in the body before they use them; homeopathy is less concerned with the intricate biochemistry involved than with whether a remedy ultimately works and heals holistically. For all these reasons, conventional medicine claims that homeopathy is not scientific, while homeopaths are quick to reply that homeopathy has been scientifically developed and studied for centuries with much documentation and success.

There continue to be many studies on the effectiveness of homeopathic treatments. Among the most celebrated, the *British Medical Journal*, published a large analysis of homeopathic treatments in 1991 that were given over the course of 25 years. This project involved more than 100 studies of patients with problems ranging from vascular diseases, respiratory problems, infections, stomach problems, allergies, recovery from surgeries, arthritis, trauma, psychological problems, diabetes, and others. The study found improvement with homeopathic treatment in most categories of

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problems, and concluded that the evidence was "sufficient for establishing homeopathy as a regular treatment for certain indications."

A 2002 pediatric journal article reported on a study that showed some individualized homeopathic remedies eased the symptoms of uncomplicated acute otitis media (ear infections) in children. While the authors admitted more research was needed, they said the positive results justified further study on homeopathic remedies for childhood ear infections.

In the United Kingdom and other countries where homeopathy is especially popular, some medical doctors incorporate aspects of acute prescribing homeopathy into their practices. Countries in which homeopathy is popular include France, India, Pakistan, Sri Lanka, Brazil, and Argentina. Large homeopathic hospitals exist in London and Glasgow, and homeopathic medical centers can be found in India and South America.

Training and certification

It takes three to four years of training to become a qualified homeopath. Naturopathic physicians study homeopathy during their four-year medical school programs, and other practitioners may study homeopathy in post-graduate courses. The Council on Homeopathic Education is the only organization that accredits training programs in classical homeopathy. To date, it has accredited five institutions: Bastyr University of Natural Health Sciences in Seattle, Washington; Ontario College of **Naturopathic Medicine** in Toronto; Hahnemann Medical Clinic in Albany, California; the National College of Naturopathic Medicine in Portland, Oregon; and the International Foundation for Homeopathy, also in Seattle. Other well-known training programs include the Pacific Academy of Homeopathic Medicine in Berkeley, California, and the New England School of Homeopathy in Amherst, Massachusetts.

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- The North American Society of Homeopaths certifies non-physician homeopaths.

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Walsh, Nancy. "Homeopathy Shows Some Promise in AOM (Obstacles to Study this Therapy Remain)." *Pediatric News* (January 2002): 16.

ORGANIZATIONS

The American Institute of Homeopathy. 1585 Glencoe, Denver, CO 80220. (303) 898-5477.

The Council for Homeopathic Certification. P.O. Box 157, Corte Madera, CA 94976.

The International Foundation for Homeopathy. 2366 Eastlake Avenue East, #301, Seattle, WA 98102. (425)776-4147.

The National Center for Homeopathy. 801 North Fairfax Street, Suite 306, Alexandria, VA 22134. (703) 548-7790.

The North American Society of Homeopaths. 10700 Old County Rd. 15, #350, Minneapolis, MN 55441. (612) 593-9458.

Homeopathy, constitutional prescribing

Definition

Constitutional homeopathic prescribing, also called classical prescribing, is a holistic system of medicine that has been practiced for more than 200 years.

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Unlike acute homeopathic prescribing, constitutional prescribing refers to the selection and administration of homeopathic preparations over a period of time for treatment related to what practitioners call miasmic disorders, those caused by an inherited predisposition to a disease. The term miasm comes from a Greek word meaning stain or pollution. As in acute prescribing, constitutional prescribing is holistic in that it is intended to treat the patient on the emotional and spiritual levels of his or her being as well as the physical. Constitutional prescribing is also aimed at eventual cure of the patient, not just suppression or relief of immediate symptoms.

Origins

Homeopathy was developed during the 1790s by Samuel Hahnemann, a German physician. Experimenting on himself with the antimalarial drug quinine, Hahnemann noticed that large doses of the medicine actually caused malaria-like symptoms, while smaller doses cured the symptoms. From this, he advanced his concept of *Similia similibus curentur*, or "let like be cured with like." Hahnemann then developed an extensive system of medicine based on this concept. He named it homeopathy, from the Greek words *homoios* (the same) and *pathos* (suffering).

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Proponents of homeopathy over the years have included Louisa May Alcott, Charles Dickens, Benjamin Disraeli, Johann Wolfgang Goethe, Nathaniel Hawthorne, William James, Henry Wadsworth Longfellow, Pope Pius X, John D. Rockefeller, Harriet Beecher Stowe, William Thackeray, Daniel Webster, and W. B. Yeats. England's royal family has employed homeopathic practitioners since the 1830s.

KEY TERMS

Aggravation—Another term used by homeopaths for the healing crisis.

Allopathy—Conventional medical treatment of disease symptoms that uses substances or techniques to oppose or suppress the symptoms.

Constitutional prescribing—Homeopathic treatment for long-term or chronic disorders related to inherited predispositions to certain types of illnesses.

Healing crisis—A temporary worsening of the patient's symptoms during successive stages of homeopathic treatment.

Law of similars—The basic principle of homeopathic medicine that governs the selection of a specific remedy. It holds that a substance of natural origin that produces certain symptoms in a healthy person will cure those same symptoms in a sick person.

Laws of cure—A set of three rules used by homeopaths to assess the progress of a patient's recovery.

Materia medica—In homeopathy, reference books compiled from provings of the various natural remedies.

Miasm—In homeopathic theory, a general weakness or predisposition to chronic disease that is transmitted down the generational chain.

Modalities—The factors and circumstances that cause a patient's symptoms to improve or worsen, including weather, time of day, effects of food, and similar factors.

Repertories—Homeopathic reference books consisting of descriptions of symptoms. The process of selecting a homeopathic remedy from the patient's symptom profile is called repertorizing.

Benefits

Homeopathic physicians seek to cure their patients on physical, mental, and emotional levels, and each treatment is tailored to a patient's individual needs. Homeopathy is generally a safe treatment, as it uses medicines in extremely diluted quantities, and there are usually minimal side effects. Its non-toxicity makes some consider it a good choice for the treatment of children. Another benefit of homeopathy is the cost of treatments; homeopathic remedies are inexpensive, often a fraction of the cost of conventional drugs.

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Classical homeopathy has been used to treat a wide range of diseases and conditions, most of which tend to be long-term. These include: **alcoholism**, **allergies**, **anxiety**, arthritis, **asthma**, bladder conditions, **chronic fatigue syndrome**, **depression**, drug dependencies, gastrointestinal problems, Gulf War sickness, **headache**, hearing problems, herpes, hypersensitivity, immune disorders, **insomnia**, joint problems, kidney conditions, liver problems, **Lyme disease**, lower back problems, **malaria**, **menopause**, menstrual problems, migraine, **multiple sclerosis**, paralysis, **phobias**, **shingles**, sinus problems, skin disorders, repetitive **stress** injury, rheumatism, vertigo, vision problems, and yeast **infections**.

Description

Constitutional prescribing is based on the patient's symptom profile and specific aspects of homeopathic theory.

Homeopathic classification of symptoms

Homeopathic practitioners use the word symptom in a more inclusive fashion than traditional medicine. In homeopathy, symptoms include any change that the patient experiences during the illness, including changes in emotional or mental patterns.

Homeopaths classify symptoms according to a hierarchy of four categories:

- Peculiar symptoms. These are symptoms unique to the individual that do not occur in most persons. Homeopaths make note of peculiar symptoms because they often help to determine the remedy.
- Mental and emotional symptoms. These are important general symptoms that inform the homeopath about the patient's total experience of the disorder.
- Other general symptoms. These are physical symptoms felt throughout the patient's body, such as tiredness, changes in appetite, or restlessness.
- Particular symptoms. Particular symptoms are localized in the body; they include such symptoms as nausea, skin rashes, or headaches.

Miasms

Homeopaths regard the patient's symptom profile as a systemic manifestation of an underlying chronic disorder called a miasm. Miasms are serious disturbances of what homeopaths call the patient's vital force that are inherited from parents at the time of conception. Hahnemann believed that the parents' basic lifestyle, their emotional condition and habitual diet, and even the atmospheric conditions at the time of conception would affect the number and severity of miasms passed on to the child. Hahnemann himself distinguished three miasms: the psoric, which he considered the most universal source of chronic disease in humans; the syphilitic; and the sycotic, which he attributed to **gonorrhea**. Later homeopaths identified two additional miasms, the cancernic and the tuberculinic. The remaining major source of miasms is allopathic medicine. It is thought that specific allopathic treatments—particularly smallpox vaccinations, cortisone preparations, major tranquilizers, and antibiotics—can produce additional layers of miasms in the patient's constitution. Constitutional prescribing evaluates the person's current state or miasmic picture, and selects a remedy intended to correct or balance that state. The homeopath may prescribe a different remedy for each miasmic layer over time, but gives only one remedy at a time directed at the person's current state. The basic principle governing the prescription of each successive remedy is the law of similars, or "like cures like."

Hering's laws of cure

The homeopathic laws of cure were outlined by Constantine Hering, a student of Hahnemann who came to the United States in the 1830s. Hering enunciated three laws or principles of the patterns of healing that are used by homeopaths to evaluate the effectiveness of specific remedies and the overall progress of constitutional prescribing:

- Healing progresses from the deepest parts of the organism to the external parts. Homeopaths consider the person's mental and emotional dimensions, together with the brain, heart, and other vital organs, as a person's deepest parts. The skin, hands, and feet are considered the external parts.
- Symptoms appear or disappear in the reverse of their chronological order of appearance. In terms of constitutional treatment, this law means that miasms acquired later in life will resolve before earlier ones.
- Healing proceeds from the upper to the lower parts of the body.

Healing crises

Homeopaths use Hering's laws to explain the appearance of so-called healing crises, or aggravations, in the course of homeopathic treatment. It is not unusual for patients to experience temporary worsening of certain symptoms after taking their first doses of homeopathic treatment. For example, a person might notice that arthritic pains in the shoulders are better but that the hands feel worse.

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Hering's third law would indicate that the remedy is working because the symptoms are moving downward in the body. In constitutional prescribing, a remedy that removes one of the patient's miasmic layers will then allow the symptoms of an older miasm to emerge. Thus the patient may find that a physical disease is followed by a different set of physical problems or by emotional symptoms.

Preparations

The most important aspects of preparation for constitutional prescribing are the taking of a complete patient history and careful patient education.

Case-taking

Homeopathic case-taking for constitutional prescribing is similar to that for acute prescribing, but more in-depth. The initial interview generally takes one to two hours. The practitioner is concerned with recording the totality of the patient's symptoms and the modalities that influence their severity. Also included are general characteristics about the patient and his or her lifestyle choices. For example, a practitioner might ask the patient if he or she likes being outside or is generally hot or cold. There is also an emphasis on the patient's lifetime medical history, particularly records of allopathic treatments.

Patient education

Homeopaths regard patients as equal partners in the process of recovery. They will take the time to explain the theories underlying constitutional prescribing to the patient as well as taking the history. Patient education is especially important in constitutional prescribing in order to emphasize the need for patience with the slowness of results and length of treatment, and to minimize the possibility of self-treatment with allopathic drugs if the patient has a healing crisis.

Homeopathic remedies

In constitutional prescribing, one dose of the selected remedy is given. Patients then wait two to six weeks before following up with the homeopath, while the body begins the healing process. At the follow-up visit, the remedy may be repeated, or a different remedy prescribed. The preparation, selection, administration, and storage of remedies for constitutional prescribing are the same as for acute prescribing. These procedures are described more fully in the article on acute prescribing.

Precautions

Constitutional homeopathic prescribing is not appropriate for diseases or health crises requiring emergency treatment, whether medical, surgical, or psychiatric. In addition, constitutional prescribing should not be self-administered. Although home treatment kits of homeopathic remedies are available for acute self-limited disorders, the knowledge of homeopathic theory and practice required for constitutional evaluation is beyond the scope of most patients.

Patients are instructed to avoid touching homeopathic medicines with their fingers. The dose can be poured onto a piece of white paper or the bottle's cap and tipped directly into the mouth. Homeopathic remedies are not taken with water; patients should not eat or drink anything for 15–20 minutes before or after taking the dose.

Homeopathic remedies may lose their potency if used at the same time as other products. Some homeopathic practitioners recommend the avoidance of mint and mentholated products (toothpastes, candies, chewing gum, mouth rinses), as well as camphor and camphorated products (including **eucalyptus** and Tiger Balm), patchouli and other **essential oils**, moth balls, strong perfumes, aftershaves, scented soaps, stress, x rays, coffee, nicotine, recreational drugs (**marijuana**) and certain therapeutic drugs (most notably cortisone and prednisone) during treatment. Patients are also advised to avoid electric blankets and dental work, as these are thought to adversely affect homeopathic therapy. Homeopathic remedies should never be placed near magnets.

Side effects

Homeopathic medicines are so diluted that sometimes no trace of the original substance can be detected. These medicines are therefore considered non-toxic and generally free of harmful side effects. The primary risks to the patient from constitutional homeopathic treatment are the symptoms of the healing crisis and individual reactions to homeopathic medicine. The complexity of constitutional prescribing requires homeopaths to have detailed knowledge of the *materia medica* and the repertories, and to take careful and extensive case notes.

An intensified healing response may occur as treatment begins, which causes symptoms to worsen, but the phenomenon is temporary. In some patients, old symptoms may reappear from past conditions from which recovery was not complete. Such phenomena are taken as positive indications that the healing process has commenced.

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Research and general acceptance

As Samuel Hahnemann's healing system grew in popularity during the 1800s, it quickly attracted vehement opposition from the medical and apothecary professions. Since the early 1900s, when the American Medical Association and pharmacists waged a battle against it, homeopathy has been neglected and sometimes ridiculed by mainstream medicine. Aside from politics, part of the reason for this opposition is that there are some aspects of homeopathy which have not been completely explained scientifically. For instance, homeopaths have found that the more they dilute and succuss a remedy, the greater effect it seems to have on the body. Some homeopathic remedies are so diluted that not even a single molecule of the active agent remains in a solution, yet homeopaths maintain that it still works. Also, homeopathy puts an emphasis on analyzing symptoms and then applying remedies to these symptoms, rather than working by classifying diseases. Thus, some people with the same disease may require different homeopathic medicines and treatments. Furthermore, conventional medicine strives to find out how medicines work in the body before they use them; homeopathy is less concerned with the intricate biochemistry involved than with whether a remedy ultimately works and heals holistically. For all these reasons, conventional medicine claims that homeopathy is not scientific, while homeopaths are quick to reply that homeopathy has been scientifically developed and studied for centuries, with much documentation and success.

There continues to be many studies on the effectiveness of homeopathic treatments. Among the most celebrated, the *British Medical Journal* in 1991 published a large analysis of homeopathic treatments that were given over the course of 25 years. This project involved more than 100 studies of patients with problems ranging from vascular diseases, respiratory problems, infections, stomach problems, allergies, recovery from surgeries, arthritis, trauma, psychological problems, diabetes, and others. The study found improvement with homeopathic treatment in most categories of problems, and concluded that the evidence was "sufficient for establishing homeopathy as a regular treatment for certain indications."

In early 2002, a study in England sought to prove homeopathy's effect on treating chronic **fatigue** syndrome. Homeopathic consultations with patients took place monthly and the homeopaths in the study were allowed to choose any remedies they deemed appropriate and changed them as needed. Patients who received homeopathic treatments reported feeling more rested, less tired, and fitter than those in the placebo control group. Overall, nearly two-thirds of chronic fatigue patients reported some improvement.

In the United Kingdom and other countries where homeopathy is especially popular, some medical doctors incorporate aspects of **acute prescribing homeopathy** into their practices. Countries in which homeopathy is popular include France, India, Pakistan, Sri Lanka, Brazil, and Argentina. Large homeopathic hospitals exist in London and Glasgow, and homeopathic medical centers can be found in India and South America.

Training and certification

It takes three to four years of training to become a qualified homeopath. Naturopathic physicians study homeopathy during their four-year medical school programs, and other practitioners may study homeopathy in post-graduate courses. The Council on Homeopathic Education is the only organization that accredits training programs in classical homeopathy. As of 2005, it had accredited five institutions: Bastyr University of Natural Health Sciences in Seattle, Washington; Ontario College of **Naturopathic Medicine** in Toronto; Hahnemann Medical Clinic in Albany, California; the National College of Naturopathic Medicine in Portland, Oregon; and the International Foundation for Homeopathy, also in Seattle. Other well-known training programs include the Pacific Academy of Homeopathic Medicine in Berkeley, California, and the New England School of Homeopathy in Amherst, Massachusetts.

There are several organizations that certify homeopathic practitioners:

- The National Center for Homeopathy is the largest homeopathic organization, with over 7,000 members. It also runs the Council on Homeopathic Education, and provides a listing of all its members and their credentials.
- The American Institute of Homeopathy is the oldest national medical body. It provides a list of D.Ht.s (Diplomate in Homeopathy) certified by the American Board of Homeotherapeutics.
- The Council for Homeopathic Certification was created in 1992 to establish a certification exam and a code of ethics. It confers upon qualified practitioners a C.C.H. (Certification in Classical Homeopathy).
- The Homeopathic Academy of Naturopathic Physicians offers a certification based on a competency exam, the "Diplomate in the Homeopathic Academy of Naturopathic Physicians" (D.H.A.N.P.).
- The North American Society of Homeopaths certifies non-physician homeopaths.

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Council for Homeopathic Certification. P.O. Box 157, Corte Madera, CA 94976.

International Foundation for Homeopathy. 2366 Eastlake Avenue East, #301, Seattle, WA 98102. (425)776-4147.

National Center for Homeopathy. 801 North Fairfax Street, Suite 306, Alexandria, VA 22134. (703) 548-7790.

North American Society of Homeopaths. 10700 Old County Rd. 15, #350, Minneapolis, MN 55441. (612) 593-9458.

Honeysuckle

Description

Honeysuckle is a large volubilate shrub of the genus *Lonicera*. There are more than 300 species of honeysuckle in the Caprifoliaceae family, found from Asia to North America. The shrub reaches heights of 20–30 ft (6–9 m), with thin, hairy branches. It has ovoid leaves that range 1.2–3.2 in (3–8 cm) long by 0.6–1.6 in (1.5–4.0 cm) wide. The plant flowers in late spring or early summer, depending on the species. Japanese honeysuckle (*Lonicera japonica*) blooms in the spring from April to May, with fragrant white flowers touched with a shade of purple that fade to yellow as they mature. The species of honeysuckle that is found in North America, the United Kingdom, and western Asia, *Lonicera caprifolium*, flowers in June. Generally, honeysuckle flowers are 1.2–1.6 in (3–4) cm long, with an inner tube of approximately the same length. All varieties of honeysuckle are famous for this tube, which is extracted and sucked for its sweet nectar. The shrub also produces a black berry. Despite the sweetness of its fragrance and nectar, the medicinal parts of the plant are bitter, due to the saponin in its stem, the 8% tannin in the leaves and the 1% insitol in its flowers.

Honeysuckle. *(©PlantaPhile, Germany. Reproduced by permission.)*

General use

Japanese honeysuckle (*L. japonica*, also called Japanese *jin yin hua*, which means gold and silver flower) and common honeysuckle (*L. caprifolium*, also called Italian honeysuckle, Dutch honeysuckle, and woodbine) are both widely used for their medicinal qualities. Although the Chinese most commonly use the bud of the flower in their medical practice, in other countries it is mostly the flowers and leaves that are used for their healing properties. Japanese honeysuckle works well as a detoxifier, and is best used for acute **infections** and inflammations. As an alterative, which cleanses and purifies the blood, and an antipyretic, which reduces **fever** with its cooling properties, Japanese honeysuckle is best used for such ailments as sore throats, swollen eyes, headaches, etc.

Acute infections and inflammations

Japanese honeysuckle is most useful in treating acute illnesses, infections and inflammations. At the onset of a cold, honeysuckle should be taken in combination with chrysanthemum flowers. Several popular Chinese formulas, such as *yin chaio* and *ganmaoling*, contain this herbal combination. Because it is a natural antibiotic, honeysuckle can also be used to treat infections caused by staphylococcal or streptococcal bacteria. Honeysuckle should be used for

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KEY TERMS

Alterative—A substance that cleanses and purifies the blood.

Antipyretic—A substance or medication that combats fever with cooling properties.

Antispasmodic—A substance or medication that prevents spasms or cramps.

Vasodilatory—Having the effect of relaxing or widening the blood vessels.

acute conditions, and is not meant to be used in the treatment of chronic illnesses.

Skin infections

Honeysuckle works well against internal infections, and it can also be used externally for skin irritation and infections. Honeysuckle has been found useful in alleviating **rashes** ranging from skin diseases to poison **oak**. For these types of skin ailments, honeysuckle is best used as a poultice. For **cuts** and abrasions that may become infected, a honeysuckle infusion can be applied externally. It is in treating skin infections that the stems of honeysuckle are used.

Circulatory system

John Gerard, a master herbalist of the sixteenth century, said that honeysuckle's "floures, be steeped in oile, and set in the Sun, are good to annoint the body that is bennumed, and growne very cold." Indeed, *L. caprifolium* as a fixed oil is good for the circulatory system. When it is heated and smoothed onto the skin, it has been shown to have a vasodilatory effect, causing the blood to flow into the dermis, which is the thick layer of skin beneath the epidermis.

Asthma and coughs

L. caprifolium can be used for **asthma** on account of its antispasmodic properties. An herbal infusion of the leaves is the best method for treating asthma. A decoction of honeysuckle flowers can be used for coughs.

Other uses

The seeds of *L. caprifolium* can be used as a diuretic. *L. villosa*, also known as American honeysuckle, has been used as a kidney stimulant. *L. japonica* has been used to treat dysentery, and **diarrhea**.

Preparations

Three teaspoons of the leaf infusion can be taken three times a day. For skin irritation, honeysuckle should be made into an infusion or poultice and applied externally to the skin. When honeysuckle is compounded in capsule form, 10–17 g can be taken daily.

Precautions

Although honeysuckle poultices are used for skin irritations, there have been cases of contact dermititis reported from pulling up Japanese honeysuckle. A patient that had come into contact with *L. japonica* reported developing a line of itchy **blisters**. People often taste honeysuckle tubes for their nectar; however, several cases of plant poisoning have been reported in children. The symptoms include gastrointestinal discomfort and **muscle cramps**.

Side effects

There are no known side effects from using honeysuckle.

Interactions

No known adverse drug interactions have been reported with honeysuckle.

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Katherine Y. Kim

Hoodia

Description

Hoodia is a genus of succulent plants, native to the Namib Desert, along the Atlantic Coast of Namibia. Although the plant looks like a cactus, it is properly part of the *Apocynaceae* or *Dogbane* family. Common names are Bushman's Hat and Queen of the Nam. Although there are several species of hoodia, *Hoodia gordonii* has gained interest as an appetite suppressant. Other species have been traditionally used as ornamental plants. There is no evidence that species other than *gordonii* have appetite suppressant effects.

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General use

Hoodia has a history of use in folk medicine by the San bushmen of Africa. According to the United States Department of Agriculture, wild hoodia is an endangered species, and international trade in hoodia is restricted under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). In the 2000s, Phytopharm, a British firm which applied for patents for hoodia, reported that it was developing hoodia plantations to assure a sustainable supply.

Although hoodia has been widely promoted as an appetite suppressant, there have been no published human studies documenting the safety or efficacy of hoodia products. Although Phytopharm claimed to have completed a double blind study showing both safety and efficacy, the details of this study were not available as of 2008. According to documents submitted to the United States Food and Drug Administration, Phytopharm apparently considered these results to be proprietary information and was unwilling to release details.

One published study, sponsored by the Council for Scientific and Industrial Research (CSIR, South Africa), documented efficacy in rats. In this study, hoodia extracts fed to rats over an eight-day period resulted in reduction in caloric intake and loss of body mass. In a subsequent study, rats were given either hoodia extract or the weight loss drug *fenfluramine*. In this study, hoodia was more effective than the traditional drug. A 2004 publication from the Hallett Center for Diabetes and Endocrinology of Brown University Medical School reported that the active principle of hoodia, a glycoside commonly called P57, when injected into the brains of rats, induced biochemical changes resulting in appetite reduction.

In one widely publicized report, Lesley Stahl of the CBS television program *60 Minutes* went to Africa and tried the plant. Although she commented favorably on its safety and efficacy, her report was anecdotal, based on a single day's use and cannot be considered significant.

Preparations

Although there are many products claiming to contain hoodia in various forms, they do not appear to be standardized. Adulterants may be present.

Side effects

There are no established side effects associated with hoodia; however, this is due to lack of information and documentation rather than an evidence of safety. In a letter to the Editor of the *New York Times*, a researcher who had been working with Pfizer Laboratories to develop a commercial form of hoodia, wrote: "An early clinical trial indeed showed that hoodia could be a potent appetite suppressant. But there were indications of unwanted effects on the liver caused by other components, which could not be easily removed from the supplement. Clearly, hoodia has a long way to go before it can earn approval from the Food and Drug Administration. Until safer formulations are developed, dieters should be wary of using it."

KEY TERMS

Anorectic—A drug that reduces the appetite.

Fenfluramine—An anorectic drug, withdrawn from the United States market in 1997 due to toxic effects.

Succulent—Any plant with fleshy stems or leaves.

Interactions

There are no established interactions with hoodia. Because preparations labeled as hoodia may contain **chromium**, persons using insulin for diabetes control should show extra caution, since this adulterant may affect the activity of insulin.

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Phytopharm Plc, Corpus Christi House, 9 West St., Godmanchester, Cambridgeshire, PE29 2HY, U.K., 44 (0) 1480-437697, http://www.phytopharm.co.uk/contacts/headoffice/.

Sam Uretsky, PharmD

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Hops

Description

Hops derive from the large perennial vine *Humulus lupulus*. This plant is native to North America and Europe but is cultivated in many other places. The vine grows to a height of 25 ft (8 m). It has heart-shaped dark green leaves and yellowish green flowers. Each plant produces either male or female flowers. Only the female flowers, called strobiles, are used medicinally. Strobiles are picked in autumn and either used fresh or dried.

General use

Hops have been cultivated to be used in the brewing of beer since at least A. D. 1000, but they also have a mixed history of use in healing. Ancient Hebrews used hops to help ward off plague. In North America, several Native American tribes independently discovered the healing properties of hops and used it as a sedative and sleep aid, to relieve **toothache**, and to improve digestion. By the end of the 1800s, hops were being used routinely in mainstream medicine in the United States as a sedative and digestive tonic. Although hops were sometimes used as a sleep aid in Europe, until relatively recently their major use in Europe was in the brewing of beer, to which they add a bitter flavor and act as a preservative. In the mid-2000s, European herbalists were much more enthusiastic about the healing properties of hops. They are used in three ways: as a sedative, as an aid in digestion, and as an antibiotic.

The best-known medicinal function of hops is as a mild sedative and sleep aid. For centuries pillows filled with hops have been prescribed for people who have difficulty falling asleep. Hops extracts taken orally are also said to promote sleep. Hops are chemically complex and contain many different compounds. Scientists have separated out several components that are sedative in nature, although it is not clear whether hops contain enough of these compounds to actually make a person sleepy. Some modern studies have given support to hops as an effective treatment for **insomnia**. The German Federal Health Agency's Commission E, established in 1978 to independently review and evaluate scientific literature and case studies pertaining to herb and plant medications, has approved hops for sleep problems, restlessness, and **anxiety**. Hops belong to the same family of herbs as **marijuana**, and some people claim it produces a mild, relaxed, euphoric feeling when smoked. There is no scientific evidence for this claim.

The second major use of hops is as an aid to digestion. Hops have been used for centuries in both **traditional Chinese medicine** and Native American healing to stimulate the appetite, ease digestion, and aid in relieving **colic**. It is believed that hops stimulate the secretions of the stomach.

The German E Commission has also concluded that hops may act as a digestive aid. Scientists have isolated another extract from the plant that in the laboratory inhibits spasms in the digestive tract and other smooth muscle.

Chinese healers use hops to treat **tuberculosis** and as an antibiotic. Test-tube studies show that the bitter acids in hops inhibit the growth of certain bacteria and fungi, including the common bacteria *Staphylococcus aureus* (responsible for staph **infections**) and *Bacillus subtilis*, but they do not inhibit *Escherichia coli*, a bacterium that causes digestive upsets. This antibacterial action may account for the preservative effect of hops in brewed beer. A 1999 study also showed that some compounds isolated from hops were effective in test-tube studies in reducing the proliferation of certain types of human breast and **ovarian cancer** cells. As of 2007, hops extract was being studied as a possible **cancer** chemopreventive.

In the early 2000s, researchers confirmed that hops contain compounds called phytoestrogens that are related to or easily converted into estrogen, the main female hormone. Some herbalists believe that the presence of an estrogenic compound accounts for the dampening of male sexual arousal and the control of sexual nervous tension ascribed to ingesting fresh hops. Other herbalists disagree, maintaining that those effects are related to the relaxing or sedative properties of hops only.

In addition to their use in healing, hops are used as an ingredient in perfume and occasionally as a tobacco or food flavoring. Their main food use and commercial value is in beer.

Preparations

Fresh and dried hops have different properties and are used to treat different symptoms. Fresh or newly dried hops, usually dampened with glycerin to reduce the rustling noise, are used in sleep pillows to help ease a restless or anxious person into sleep. As the hops age, they change in chemical composition. For this reason, the hops in pillows should be changed every few months. Fresh hops can also be made into a tea that is taken to combat insomnia. The tea is made by steeping about two teaspoons of fresh hops in one cup (250 ml) of boiling water for five minutes.

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KEY TERMS

Phytoestrogen—Any of several compounds found in plants that possess estrogen-like activity.

Tincture—An alcohol-based extract prepared by soaking plant parts.

Dried hops change in composition when exposed to light, heat, or moisture. They should be stored in a container that excludes moisture and light and should be kept at room temperature. Dried hops are used to treat digestive and other complaints. They can be prepared various ways. As a tincture, about 1/2 tsp (2 ml) can be taken three times a day. Capsules are available commercially to take before meals to aid digestion. Dry extract or powder can be added to boiling water to make a tea. Compresses are made by soaking a pad in the infusion or diluted tincture. An essential oil is produced by steam distillation. Hops are also used in combination with other herbs in commercially available remedies.

Precautions

Hops are not recommended for people suffering from **depression**. Their sedative action may accentuate depressive symptoms in these people. Some herbalists recommend that pregnant women and those with estrogen sensitive **breast cancer** avoid hops because of the possibility that they contain an estrogenic compound. Hops are included on the United States Food and Drug Administration's list of foods "Generally Recognized as Safe"(GRAS).

Side effects

There are no known side effects if hops are used in the recommended dosages. Some people who pick fresh hops may develop a skin rash (**contact dermatitis**).

Interactions

As of 2008, there had been little scientific study of the interaction of hops and pharmaceuticals. As noted above, however, people who are depressed or who are taking medications for depression should consult a doctor before using hops.

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Tish Davidson, A. M.
Rebecca J. Frey, Ph. D.

Horehound

Description

Horehound (*Marrubium vulgare L.*), commonly known as white horehound, is a European native of the Lamiaciae or mint family. Other names for this ancient remedy include houndsbane, marrubium, eye of the star, seed of Horus, marvel, bulls' blood, and houndsbane. Horehound is a hardy perennial that has naturalized throughout North America; it may be found in sunny, wayside places, thriving even in poor, dry soil. The common name horehound comes from the Old English words *har* and *hune*, meaning downy plant. This descriptive name refers to the white hairs that give this herb its distinctive hoary appearance. Another suggested derivation is from the name of the Egyptian god of sky and light, Horus. Horehound is one of the oldest known **cough** remedies. It was one of the herbs in the medicine chests of the Egyptian pharaohs. In Roman times, Caesar's

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antidote for poison included horehound. The generic name is believed to be derived from the Hebrew word *marrob*, meaning bitter juice. Horehound is one of the bitter herbs used in the Jewish Passover rites. Throughout its long history, white horehound has been valued not only as a folk remedy for coughs and congested lungs, but also as a magic herb for protection against the spells attributed to witches.

Black horehound (*Ballota nigra*), also known as black stinking horehound, is the smelly relative of white horehound. It belongs to the same family of plants as white horehound and is credited with some of the same medicinal applications. Both black and white horehound have been used to treat the **bites** of snakes and mad dogs, to rid the system of intestinal **worms**, and as antidotes to vegetable poisons. Black horehound is considered to be especially useful in quelling the **nausea** associated with **motion sickness**, or to stop the **vomiting** brought on by nervous tension. It also acts as an emmenagogue, restoring a healthy balance to the menstrual cycle.

White horehound is a bushy plant that grows nearly 2 ft (61 cm) tall from a short, stout, and woody root. The small oval leaves are bitter to the taste, with a musky aroma. They are wrinkled and dark green on top, and pale with downy white hairs on the underside. The leaves are opposite and deeply veined, growing on hairy, square, branching stems also covered with downy white hairs. The lower leaves of white horehound have long stalks, while the upper leaves are smaller and stalkless. The small white flowers form dense whorls at the leaf axils, blooming in the second year of growth from June to August. Flowers are tubular with two lips. Four small shiny dark brown seeds are carried in each nutlet after flowering. Horehound seeds have tiny barbs to attach to animal fur and clothing, while horehound blossoms attract bees to the garden.

General use

White horehound is best known as a time-honored cough remedy, found in syrup, candy and tea preparations. The aerial parts of the plant are used medicinally. The active ingredients include sesquiterpene **bitters**, marrubin, volatile oil, tannins, flavonoids, and mucilage. White horehound is antiseptic. An infusion used as a wash, or a preparation of horehound salve is useful to disinfect **wounds**. A cold infusion of white horehound acts as a bitter digestive tonic and will stimulate the flow of bile from the gall bladder. It is diuretic and may also relieve flatulence and stimulate appetite. White horehound stimulates discharge of bronchial mucus, loosening and expelling phlegm. It is beneficial in the treatment of **croup**, **bronchitis**, and **whooping cough**, and has been used in the past in the treatment of **tuberculosis**, once known as consumption. White horehound is also said to normalize cardiac arrhythmias. A warm infusion is diaphoretic, meaning that it will promote sweating. It has been used to break fevers and to treat **jaundice** and typhoid **fever**. The finely chopped leaves, mixed with honey and chewed slowly, will ease a **sore throat** and relieve hoarseness. The herb was also used following **childbirth** to promote expulsion of the placenta. White horehound combines well with other herbs in medicinal infusions, including elecampane (*Inula helenium L.*) and **licorice** (*Glycyrrhiza glabra*).

Many of the time-tested traditional uses for this safe herbal remedy have not been clinically proven. White horehound has been approved for treatment of bronchial problems and as an appetite stimulant by the German E Commission—an advisory group on herbal medicines in that country. The U.S. Food and Drug Administration (FDA), however, has declared horehound ineffective for its traditional medicinal use as a sore throat remedy, while approving it as a safe food additive.

It is possible, however, that horehound may prove to be useful in herbal treatments for inflammation. In 2002, French researchers reported isolating new glycoside compounds in horehound, one of which has anti-inflammatory activity. In addition, a group of American researchers studying traditional Mexican herbal remedies for **headache**, **asthma**, arthritis, fever, and menstrual cramps found that horehound has a high

KEY TERMS

Antioxidant—An enzyme or other organic substance that is able to counteract the damaging effects of oxidation in living tissue.

Diaphoretic—A medication given to induce sweating.

Emmenagogue—A substance or medication given to bring on a woman's menstrual period.

Infusion—The most potent form of extraction of an herb into water. Infusions are steeped for a longer period of time than teas.

Mucilage—A gummy or gelatinous substance found in some plants, including horehound.

Tincture—The extraction of an herb into an alcohol solution for either internal or external use.

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antioxidant content that may explain its inclusion in folk remedies for these conditions.

Preparations

Tincture: Combine 4 oz of finely-cut fresh horehound leaf (or 2 oz of dry powdered herb) with 1 pt of brandy, gin, or vodka in a glass container. There should be enough alcohol to cover the plant parts and have a 50/50 ratio of alcohol to water. Cover and store the mixture away from light for about two weeks, shaking several times each day. Strain and store in a tightly-capped dark glass bottle. A standard dose is 10–15 drops of the tincture in water, up to three times a day.

Infusion: Place 2 oz of fresh horehound leaves in a warmed glass container. Bring 2.5 cups of fresh, non-chlorinated water to the boiling point and add it to the herbs. Cover. Infuse the tea for about ten minutes. Strain and sweeten to taste. Drink warm or cold, depending on the intended results. The prepared tea will store for about two days in the refrigerator. Drink three cups a day.

Syrup: Using fresh leaves, prepare a strong infusion of horehound using twice the amount of fresh herb. Combine the infusion with a 50/50 mixture of honey and brown sugar. Use 24 oz of sweetener for each 2.5 cups of the herbal infusion. Heat the mixture in a glass or enamel pot and stir frequently as the mixture thickens. Cool and pour into clearly-labeled glass bottles. Refrigerate for storage. One teaspoonful of syrup may be taken three times a day, or every two hours if needed in acute illness.

Precautions

Pregnant women should not self-medicate with horehound herbal preparations. Lactating women should also consult with a qualified herbalist before using the herb internally. Infants and children under two years of age should not be given horehound. Do not use horehound medicinally if there is chronic disease of the gastrointestinal tract, such as ulcers, esophageal reflux, **colitis**, or diverticulosis. Large doses of horehound may have a purgative action. Very large doses may cause irregular heartbeat.

Side effects

When horehound is taken internally, it may interfere with the absorption of **iron** and other minerals.

Interactions

No interactions have been reported between horehound and standard pharmaceutical preparations. However, some anesthesiologists recommend that patients scheduled for any surgery requiring total anesthesia should discontinue all herbal preparations for 1–2 weeks before the operation. The reason for this precaution is that some herbal preparations appear to interfere with the action of inhaled anesthetics.

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Herb Research Foundation. 1007 Pearl St., Suite 200, Boulder, CO 80302. (303) 449-2265. www.herbs.org.

New York Botanical Garden. Bronx River Parkway at Fordham Road, Bronx, NY 10458. (718) 817-8700. www.nybg.org.

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Horse chestnut

Description

The European horse chestnut, *Aesculus hippocastanum*, is the horse chestnut most frequently used in herbal medicine. It is a member of the Hippocastanaceae family. Horse chestnuts are in an entirely different botanical family from the well-known sweet chestnut tree, *Castanea vesca*. Horse chestnuts exist in nature as both a tree and a shrub, and are found in all temperate regions of Europe, Asia, and North America.

There are 15 recognized species of horse chestnut. The European horse chestnut is believed to have originated in the Balkan region of eastern Europe but is now grown in every country in the Northern Hemisphere.

The name *Aesculus* is actually a misnomer, coming originally from the word *esca*, meaning food. It was applied by ancient peoples to a certain species of oak; and somehow the name was transferred over the years to the horse chestnut. The name *hippocastanum* is thought to refer to the horse chestnut's ability to heal horses and cattle of respiratory illnesses. Another possibility may be that it is named for the small horseshoe-like markings that are present on the branches of the horse chestnut tree.

Horse chestnut trees grow in nearly any soil but seem to prefer a sandy loam. They grow very rapidly into tall straight trees that can reach heights of over 100 ft (approximately 30 m) tall, with widely spreading branches. The bark is grayish-green or grayish-brown in color, and the tree limbs are thick and have corky, elongated, wart-like eruptions that appear from a distance like ribbing. The interior of horse chestnut bark is pinkish-brown, with fine lines running its length. It is odorless and its taste is very bitter and astringent.

The characteristic horseshoe markings found on the branches are actually the scars from where leaves previously grew. Horse chestnut wood is seldom if ever used for lumber due to its soft and spongy character. Large leaf and flower buds are clearly visible even during winter months but are encased in a scaly, resinous protective covering that prevents damage from frost or damp. This thick sticky coating melts with the beginning of warm weather in spring, and flowers and leaves appear with remarkable rapidity, usually within three to four weeks.

The leaves are dark green, rough in texture, and large, with minutely serrated edges. Horse chestnut leaves can be nearly 1 ft (0.3 m) in length. They somewhat resemble a hand with five to nine leaf sections emerging from a palm-like base to form the finger-like projections. European horse chestnuts produce clusters of white flowers with a pale scarlet tinge at the throat or yellow mottling. American horse chestnut flowers can be white, pale pink, or yellow, depending upon the species. All types of horse chestnut trees, with their graceful wide limbs and showy flowers, are grown for their ornamental beauty.

The fruit of the horse chestnut is a dark brown smooth-surfaced nut approximately 2 in (5 cm) in diameter. It has a polished appearance except for the rounded dull tan-colored scar on the side that was attached to the seed vessel. Horse chestnuts are encased in a light green spine-covered coating that divides into three parts and drops away prior to the nut dropping from the tree. Horse chestnut nuts contain mostly carbohydrates which are generally indigestible until boiled. They also contain saponins, tannin, flavones, two glycosides, aesculin and fraxin, some crude protein, a fatty oil, ash and water.

Horse chestnuts native to North America are called buckeyes because of their large seeds resembling the eye of a buck, or male deer.

American horse chestnuts are divided into four types:

- Ohio buckeye, or *Aesculus glabra*, is a medium-sized tree which grows from the southern United States to the prairies of western Canada. It is the state tree of Ohio, hence the state's nickname of the Buckeye State.
- Yellow buckeye, *Aesculus octandra*, or *Aesculus flava*, is a tree that grows to heights of 40 ft (12 m) or more. It is fairly common across the central portion of the United States. Its leaves are somewhat smoother than those of other horse chestnuts.
- Red buckeye, or *Aesculus pavia*, is a shrub or small tree that generally is found in the southern United States. In early summer it develops brilliantly scarlet flowers in large clusters, and has dense foliage. The tree species of red buckeye grows to heights of between 15–20 ft (5–7 m) tall.
- California buckeye, or *Aesculus californica*, is a horse chestnut tree found all along the Pacific coast.

General use

Horse chestnuts have been used as fodder for feeding farm animals, and some Native American peoples have included them in their diet. However, the outer covering of the horse chestnut nut is toxic, and the nut itself has to be boiled prior to being eaten

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safely. Its wood, which is too soft for furniture-making or construction, is used in building crates and other packing cases.

Both the bark and the fruit from horse chestnut trees are used medicinally to strengthen and tone the circulatory system, especially the venous system. It is used both internally and externally to treat varicose veins, **phlebitis**, and hemorrhoids. Horse chestnut preparations are particularly effective in treating varicose ulcers. Due to its ability to improve circulation, it is also helpful for the relief of leg cramps. Its bark also has narcotic and fever-reducing properties. A compound known as aescin, which is present in the horse chestnut fruit, is now often added to external creams and preparations used for the treatment of **varicose veins**, varicose ulcers, bruises, and sports injuries.

Horse chestnut preparations using the seed, bark, twigs, and leaves are all utilized in traditional Chinese medicine. Chinese herbalists consider horse chestnut to be a part of treatment not only for circulatory problems, but use it as an astringent, as a diuretic, for reduction of **edema** or swelling, to reduce inflammation, as an expectorant in respiratory problems, and to fight viruses.

Preparations

Horse chestnut bark is removed in the spring, in strips 4 or 5 in (10–13 cm) long, about 1 in (2.5 cm) thick and broad. The fruit of the horse chestnut is gathered in the autumn, when they fall from the tree. Both the bark and the fruit are dried in sunlight or with artificial heat, and are either kept whole or ground to a powder for storage. A decoction, made of 1 or 2 tsp of the dried, pulverized bark or fruit left to simmer for 15 minutes in 1 cup of water can be either taken internally three times a day or used externally as a lotion. Horse chestnut preparations are also available as tinctures, extracts, capsules, and external ointments and lotions.

Precautions

The outer husks of the horse chestnut fruit are poisonous. There are also reported cases of poisoning from eating raw horse chestnuts.

Side effects

There have been reported cases of gastrointestinal irritation, **nausea**, and **vomiting** from taking large doses of horse chestnut. There are also rare reports of rash and **itching**, and even rarer cases of kidney problems.

Interactions

Horse chestnut's ability to reduce blood coagulation, or clotting, indicates that it should not be given to those with bleeding disorders or who are taking anticoagulant drugs. It is known to add to the action of blood thinning drugs such as warfarin or aspirin.

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Horsetail

Description

Horsetail is a perennial plant that is found in or near watery areas such as marshes, streams, or rivers. Horsetail grows in temperate northern hemisphere areas of Asia, Europe, North America, and North Africa. It flourishes where it can root in water or clay soil.

Horsetail is a derivative of larger plants that grew 270 million years ago during the carboniferous period. It belongs to the Equisetaceae family and is a relative of the fern.

There are over 20 species of horsetail. The species most commonly used medicinally is field horsetail (*Equisetum arvense*). *E. arvense* grows up to 1.5 ft (0.5 m) in corn fields and wet meadows. Wood horsetail (*E. sylvaticum*) grows in copses and on hedgebanks, usually to a height of 1-2 ft (0.3-0.6 m). This species is used as food for horses in parts of Sweden. River horsetail (*E. maximum*) is the largest of the European species of horsetail. Found in bogs, ditches,

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KEY TERMS

Decoction—An herbal tea created by boiling herbs in water. Roots, bark, and seeds are used in decoctions; boiling the herbs brings out their medicinal properties.

Diuretic—A substance that promotes urination.

Edema—A condition that occurs when fluid accumulates in the tissues of the body.

Incontinence—The inability to control urination.

Infusion—An herbal tea created by steeping herbs in hot water. Generally, leaves and flowers are used in infusions.

Perennial—A plant that lives for many years and comes back yearly without replanting.

Sitz bath—A bath in which only the hips and buttocks are soaked.

and on banks of rivers and ponds, *E. maximum* grows to a height of 3-6 ft (1-2 m).

Horsetail has no leaves or flowers and grows in two stages. The first stage occurs during the early spring. At this time, a fertile hollow stem appears that resembles asparagus. After these stems have withered and died, the second stage begins. During this stage, which occurs during the summer months, thin green barren stems branch out from the plant. It is during this stage that horsetail is gathered for medicinal use.

Horsetail was named for its bristly appearance. The genus name *Equisetum* is derived from the Latin words *equus*, meaning horse, and *seta*, meaning bristle. Other names for horsetail include shave-grass, bottlebrush, and paddock-pipes.

Horsetail contains silicon, **potassium**, aluminum, **manganese**, saponins, phytosterols, phenolic acids, cafeic acids, alkaloids, and tannins. Fifteen types of **bioflavonoids** are also present. These bioflavonoids are believed to be responsible for horsetail's strong diuretic action. The high silicon content of the herb strengthens connective tissue, ligaments, bones, hair, and fingernails.

Origins

The medicinal use of horsetail dates back to ancient Roman and Greek times. The Greeks used horsetail as a wound healer, a diuretic, and an agent to stop bleeding. Nicholas Culpeper, a popular seventeenth-century herbalist, wrote of horsetail's beneficial properties in stopping bleeding, and treating ulcers, **kidney stones**, **wounds**, and skin inflammation. In the nineteenth century, horsetail was also used to treat **gonorrhea**, prostatitis, and **urinary incontinence**.

The North American native peoples used horsetail to treat a number of kidney and bladder ailments. The Cherokee used horsetail to aid the kidneys. Chippewa natives made a decoction out of horsetail stems and used it to treat painful or difficult urination. The Okanagan-Colville and Potowatami peoples made a horsetail infusion as a diuretic to aid kidney function.

Horsetail's reedy exterior and **silica** content have made it a popular metal polisher and natural abrasive cleanser. One species is so rich in silica that it was imported from Holland for the purpose of polishing metal, hence the nickname Dutch rushes. Another nickname is pewterwort, so named because it was used to scour pewter. Dairy maids of England used horsetail to scour their milk pails, while early Americans used it to scrub their metal pots and pans.

Horsetail has been used internally and externally as a folk medicine to treat rheumatism and **gout**, coughs and **asthma**, **acne**, brittle hair and fingernails, and as a blood purifier. Shoots of a larger species of horsetail were sometimes eaten by the poorer classes, although the food lacked taste and wasn't very nutritious.

General use

Herbalists still use horsetail to treat a variety of kidney and bladder problems. Horsetail has properties that help bladder and kidney tissue. Its tonifying effects help to reduce inflammation in conditions such as kidney stones, bladder and **kidney infections**, weak bladder, weak kidney, and urinary incontinence.

The German Commission E has approved horsetail as an effective treatment for kidney and bladder inflammations, **edema**, urinary tract **infections**, and bacterial infections. It is also used as a component in diuretic drugs.

Silica and horsetail

Horsetail is rich in minerals, particularly silica deposited in its stems. Silica helps to promote the body's absorption of **calcium**, an important component in tissue repair and bone and cartilage formation. Horsetail's silica and silicic acid content ranges from 5-8%, making it a good source for strengthening weak connective tissues, and healing bones, **fractures**, and torn ligaments. Horsetail is also used to treat arthritis and **osteoporosis**, as the silicon in horsetail may replace lost silicon in the affected bones.

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Horsetail may be a possible remedy for senility. Senility often occurs when there is more aluminum in the blood than silica. One theory suggests that when the silicon and aluminum levels are balanced, the symptoms of senility will disappear.

Wound healer

Horsetail's ability to stop blood flow has made it useful in treating **nosebleeds**, internal bleeding, heavy menstrual bleeding, bleeding **hemorrhoids**, and bleeding wounds. Often a compress made from fresh horsetail juice is placed on the wound to stop the flow of blood. The healing effect may be strongest when horsetail is taken both internally and externally.

Other uses

Horsetail is also used to remedy brittle nails, bleeding wounds, **hair loss**, cystic ulcers, **rheumatoid arthritis**, gout, gonorrhea, digestive disturbances, **bronchitis**, lung disorders, **tuberculosis**, poor teeth and gums, **varicose veins**, and fallen arches. Skin ailments such as **sties**, **rashes**, itchy **eczema**, or eye inflammation may be treated with an external compress made from horsetail tea.

Preparations

Horsetail is gathered in the spring and early summer, after the fertile stems have died and the barren shoots have grown. The plant is cut above the root and the stems are used dried or fresh. Horsetail is available in dried bulk, powder, capsules, tablets, or tincture forms.

It is recommended that commercial preparations of horsetail contain no more than 3% blackish rhizome fragments and no more than 5% stems or branches from other horsetail species. Standard preparations generally contain 10% silicic acid and 7% silica.

Taken as a dietary supplement, horsetail is a good source of calcium and silica. Horsetail can be made into a tea (infusion or decoction) and consumed internally. Horsetail may also be used in full body baths, sitz baths, foot baths, compresses, hair rinses, and poultices.

For the capsule form, two capsules can be taken with water up to two times daily.

To make a tea, 1 cup of boiling water can be poured over 2 tsp of dried horsetail and steeped for 15 minutes. Up to 4 cups of the cold tea can be drunk daily for bladder or kidney ailments. The tea may be used externally as a hair rinse for **dandruff** or an oily scalp.

About 10-60 drops of the tincture can be used daily.

Precautions

Pregnant or nursing women and people with severe kidney or liver disease should consult their health practitioner before using horsetail. People with high blood pressure or heart problems should not take horsetail. Horsetail contains low levels of nicotine and may not be safe for young children. Horsetail shouldn't be taken internally for more than three days, and people should not take more than the normal dosage. Long-term use or high doses of horsetail have caused irreversible kidney damage due to too much silica. It is best to follow dosage guidelines and use properly harvested horsetail since the older shoots are higher in silica.

Commercial preparations that are processed at high temperatures are recommended since the heat destroys a potentially harmful enzyme, thiaminase, found in crude horsetail.

When horsetail is gathered for medicinal use, plants with brown spots aren't collected. Brown spots may indicate the presence of a toxic fungus. Horsetail that grows near an industrial or waste site or in heavily fertilized areas should not be harvested since it can pick up nitrates and **selenium** from the soil. The correct species of horsetail should be collected. Marsh horsetail (*E. palustre*) is poisonous.

Side effects

Mild side effects include **diarrhea**, upset stomach, and increased urination.

Severe side effects that may require medical attention are kidney **pain**, lower back pain, pain while urinating, **nausea**, or **vomiting**. These symptoms may signal kidney damage. Heart palpitations can occur if horsetail is overused. If this happens, immediate medical attention is required.

Interactions

People taking digitalis-type drugs should consult their health practitioner before taking horsetail.

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Hot flashes

Definition

Hot flashes, experienced by large numbers of women and some men as a result of surgical, chemical, or age-induced changes in estrogen levels, are characterized by a rapid rise and discharge of heat with perspiration, discomfort, and possible redness. Ranging from mild to severe in intensity, they may be preceded by an aura-like experience and may be followed by a subsequent feeling of chill. With natural, age-related **menopause**, hot flashes may begin as early as two years prior to the cessation of menses and continue as long as five or more years afterward. Statistically, the average experience is approximately four years of varying intensities.

Description

Approximately 20% of women without **breast cancer** and 50 to 75% of women taking tamoxifen subsequent to breast **cancer** reportedly seek a doctor's advice for the management of hot flashes. For women without breast cancer, this seems to be a conservative estimate, given that another source notes that as many as 85% of women experience hot flashes at some time during menopause. Statistics are mixed with regard to overall duration. One study reported that only 20% of women reported still having hot flashes after four years, while another reported 25 to 50% of women continue having them as long as five years. Hot flashes appear to be more common among African American women than white, Japanese, Hispanic, or Chinese women, while Mayan Indian women report no symptoms associated with menopause at all.

Hot flashes may be preceded by a prodromal experience, or set of signs, of rapid heart rate, **anxiety**, and **dizziness** or weakness. There is considerable variation in the experience of hot flashes. As the flash comes on, there is a feeling of sudden heat that may produce as little as a beading of perspiration on the upper lip or a sudden and uncontrollable drenching. The sudden heat may be followed by a cold, clammy sensation and coldness, as evaporation of perspiration occurs. Hot flashes generally last from 30 seconds to five minutes, although in some cases they may last as long as half an hour. Although hot flashes can occur at any time, the most common time of onset is between six and eight in the morning and six and ten at night.

A stressful incident may precede the hot flash, and keeping a journal of these events as a means of identifying triggers may be helpful. Depending on the intensity, severity, and timing, embarrassment may also accompany the hot flash when others witness the sudden, unmistakable experience. Breast cancer, premature onset of menopause, faster onset rate of menopause, tamoxifen therapy in women and anti-androgenic therapies in women and men may contribute to more severe and longer durations of hot flashes. Each person's experience with hot flashes is different, and each person can experience a wide variation of symptoms over time.

Causes and symptoms

The exact cause and mechanism of hot flashes is not well understood. What is recognized is that as estrogen levels are depleted, whether due to surgical, chemical, or natural age-related changes, the hypothalamus in the brain, which regulates several functions, including body temperature, becomes confused. The core body temperature set point is lowered, and the threshold between acceptable and non-acceptable body heat levels is more easily crossed. When that occurs, signals are sent to the rest of the body of a sudden need to discharge heat, accomplished through the sudden release of perspiration from the sweat glands. Studies reveal measurable rises in skin temperature. Other hypothalamic signals cause awakenings from sleep, changes in blood pressure and heart rate, and anxiety states (alertness), as if the body is in fight-or-flight mode.

Common accompanying symptoms include:

- sleep disruptions
- fatigue
- night sweats
- heart palpitations
- irritability
- short-term memory loss
- attention span changes
- depression and weepiness
- uncharacteristic rage or impatience
- dryness of eyes and vagina
- reduced libido and interest in sex
- accelerated bone loss

Diagnosis

In most cases, diagnosis of hot flashes is not difficult. What may be difficult is assessing existing levels of hormones, anticipating the duration of menopause and menopausal symptoms, and finding safe, effective treatment options. Family history, personal medical history, including history of pregnancies and births, a physical examination, diagnostic assessments such as

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blood tests for thyroid and adrenal (**stress** coping) function, and hormonal assays (blood or saliva) may be recommended. Bone density testing and, depending on history, more regular mammograms and Pap tests, though not diagnostic of hot flashes, may become advisable.

Treatment

Several alternative treatments are effective.

Phyto- (plant-derived) hormones

The most widely proclaimed remedies in this category include **black cohosh** (*Cimicifuga racemosa*), wild yam (*Dioscorea villosa*), **dong quai** (*Angelica sinensis*), **red clover** (*Trifollium pratense*), and **licorice** (*Glycyrrhiza glabra*). Also in this category are soy and two soy isoflavones: genistein and daidzein. Of all of these, black cohosh, wild yam, and soy have shown the greatest efficacy. They have also incited controversy.

Black cohosh may be the most well-studied of all the phyto-estrogens. In North America, Native American women have traditionally used it. The German Commission E, whose stamp of approval makes prescriptive use of black cohosh reimbursable, recommends, according to one source, use for no longer than six months at doses of 20 to 40 mg daily [of the concentrate]. Although black cohosh is a common alternative treatment for hot flashes, an extensive 2006 study funded by the National Institutes of Health, found no difference in effectiveness between black cohosh supplements and a placebo. However, many women continue to give personal testimony to its effectiveness.

A study examining the reduction of hot flashes from use of soy flour showed a 40% reduction, 15% greater than placebo. However, considerable controversy about an estrogen additive effect in women at risk or with a history of breast or **uterine cancer**, and in men at risk of **prostate cancer**, warrants caution. One study noted that the soy isoflavones stimulated tumor growth and opposed any beneficial effects tamoxifen might have.

Dong quai was reported to be equivalent to placebo with regard to hot flashes, with an advisory caution. Dong quai belongs to a family of herbs that contain warfarin (Coumadin)-like substances and is, therefore, contraindicated for use in persons on warfarin (Coumadin) or other blood thinning therapies.

Wild yam and licorice have both been used and recommended for their progesterone-like qualities. Many of the progesterone creams available without prescription have wild yam as a basic source ingredient. Many of these creams also contain pharmaceutical grade (concentrated and standardized) amounts of progesterone. Without monitoring use by saliva sampling a worsening of hot flashes may be provoked by progesterone's estrogen suppressive capacity. Licorice has been historically included in many combination herbals in **traditional Chinese medicine** as a synergistic (exponentially additive) element; however, caution is advised for persons with high blood pressure.

A red clover study of 252 women divided into three groups, two each using a separate red clover supplement for 12 weeks and one control group, reported a 40% improvement and no significant side effects. An average of eight hot flash episodes was reduced to an average of five in the two trial groups. Women who have had breast cancer should be cautious about the use of red clover because it has some effects that are similar to estrogen.

Traditional Chinese medicine (TCM)

TCM divides menopause into "hot" and "cold" menopause, on the basis of a thorough history taking and examination of the tongue and pulses (six different pulses). Both **acupuncture** and Chinese herbology may be employed to reduce stress, facilitate the movement of chi (or Xi—the body's internal energy flow), and balance body systems. While some critics claim TCM no more effective than placebo in controlling hot flashes or the symptoms of menopause, with few documented benefits, others point to the survival of this tradition in medicine for thousands of years and believe that something more than a **placebo effect** is shown.

Vitamins and vitamin E therapy

Vitamin E therapy is perhaps one of the most historically recommended therapies in North America for hot flashes, in a dosing range from 400 to 1,000 International Units (IU), daily. Since the 1940s, vitamin E has been believed to be useful in reducing hot flashes and another common symptom of estrogen deficiency: vaginal dryness. However, after rigorous scientific study vitamin E was found to be only as effective as placebo, and as of 2008 the Mayo Clinic reported that it was no longer recommended for use in treating hot flashes.

Dietary changes

Weight and fitness have been demonstrated to be factors in the management of hot flashes. Weight is recommended to be height proportionate. Women with less body fat may have as difficult a time as

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women with too much body fat. Fitness is especially important, and **exercise** has been demonstrated to improve stamina and attitude, which contribute to tolerance.

Nuts, whole grains, apples, celery, **alfalfa**, and beans have all been recommended as useful dietary adjuncts. One source reports that a general, dietary "housecleaning back to basics," eliminating highly refined and processed foods, including fast foods and junk food, reducing or eliminating sugar and sugar-substitute products such as aspartame, eating more vegetables and fruit, and including in the diet **essential fatty acids** such as flax or fish oils, may go a long way toward stabilizing the nervous system and supporting more normal activity in the hypothalamus.

Natural hormone replacement therapy

Licensed practitioners and others in the health-care community have recognized for some time that there is a relationship between high estrogen (estradiol or E2) levels and **fibrocystic breast disease**, **uterine fibroids**, **endometriosis**, and fertility dysfunction. Saliva sampling was developed as an alternate means of effectively monitoring not just the levels of circulating hormone but the amount of biologically active circulating hormone. The pioneer lab, DiagnosTechs, of Kent, Washington, developed a female hormone profile that tracks the interplay of estrogen and progesterone across the span of a menstruating woman's cycle. They also developed a post-menopausal panel to assess the more static balances of women after **menstruation** ceases, and a testosterone panel for men. Information from these kinds of tests are valuable aids in assessing an individual's existing hormone values, especially when compared to statistical data of physiologically effective ranges. This information allows for safer, more precise and individual—not one size fits all—use of hormone replacement therapy.

A special class of pharmacist, known as a compounding pharmacist, is able to formulate a hormone replacement of molecularly identical phyto-hormones (usually soy and wild yam), standardized to a calculated milligram strength, for use by prescription. These natural estrogen replacements make broadest use of the weakest, most gentle fraction of estrogen, estriol (E3). The other fractions are estradiol (E2)—the most potent—and estrone (E1). Although natural hormones are available in capsules, the most commonly recommended forms are sublingual (under the tongue) drops, or a topical cream or gel, in order to avoid adding further burden to the liver. The liver is responsible for metabolizing the chemistry of the body, and by the time hormone replacement therapy is usually needed, the liver has been hard at work for many years. Drops and creams also allow individual tailoring. **Natural hormone replacement therapy**, however, must be used with the same caution as pharmaceutical synthetics. But some people believe that because of their molecularly pure identity they may be safer and reduce the health risks that have become associated with synthetic hormone replacement therapy. Without clinical trials, statistical proof and good data remain unavailable. The International Academy of Compounding Pharmacists (IACP) maintains a Web site to help locate compounding pharmacists (http://www.iacprx.org/about_iacp/). The American Association of Naturopathic Physicians also maintains a Web site of licensed members (http://www.naturopathic.org).

Liver support and detoxification

Because the liver is the primary organ for metabolizing hormones, therapies that may include a liver support or **detoxification** may assist in a smooth transition through menopause. This might be especially important in persons whose hot flashes are surgically or chemically induced because the need for both of these kinds of interventions was likely preceded by hormone-related illness. Colon cleansing and increased intake of dietary and soluble fibers may also be recommended. Sources of dietary and soluble fiber include whole grains and grain brans, most vegetables, many fruits and fruit pectin, **psyllium**, and guar gum.

Allopathic treatment

Premarin and Prempro

For many years, the standard remedy for relief of hot flashes was premarin, a product derived from the urine of pregnant mares. During **pregnancy**, levels of the most potent fraction of estrogen, estradiol (E2), are down graded to a less potent fraction, estrone (E1). (Estrone is more potent than estriol, or E3.) Mares were kept pregnant, catheterized for urine collection, and dehydrated for more concentrated urine. That fact alone was enough to dissuade some women from using it. However, no other single remedy had been shown to have the efficacy (96%) of reducing or eliminating hot flashes like estrogen (as premarin) hormone replacement therapy.

Mares have similar but not identical estrogens compared to humans. One of the substances specific to mare estrogen is genetically toxic to humans. Furthermore, in

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the normal female's physiology, estrogen is opposed by progesterone, another female reproductive hormone. Supplementing estrogen using premarin, unopposed by progesterone, resulted frequently in a condition known as hyperestrogenism and increased risks and rates of breast and uterine cancer. Ignoring a possible genetic toxicity of premarin, subsequent prescriptions for hormone replacement therapy concentrated on opposing Premarin's estrogen in a combination patented hormone drug called Prempro. In the summer of 2002, results of the Women's Health Initiative study were released; these data statistically demonstrated the increased health risks (breast cancer, **stroke**, and **heart attack**) of these modalities. Along with results of other studies suggesting that estrogen replacement therapy was also not as protective against **osteoporosis** as had once been believed, serious reconsideration of hot flashes management was prompted. As of 2008 the general recommendations for hot flash management are to reduce the hot flashes as much as possible using non-hormone therapies and if necessary to use the lowest dose of hormone replacement found to be effective for the shortest amount of time reasonable.

The progestins

Depomedroxyprogesterone acetate (MPA) has been reviewed and found, at doses of 150 mg every one to two months (as an injection), for women with endometrial cancer to be 85% effective in reducing hot flashes when compared with estrogen. Oral doses of 10 mg/day were 87% effective. Reported side effects included: irregular vaginal bleeding, weight gain and bloating, breast tenderness, and mood swings.

Blood pressure medications (antihypertensives)

Blood pressure medications—alpha-adrenergic agonist antihypertensives—that inhibit the stress trigger pathways involved in hot flashes, reduce hot flashes 20% to 65%. Drugs and dosages used include: clonidine (0.05–0.2 mg/day); lefoxidine (0.1 mg/day); and methyldopa (250 mg three times daily). Side effects of dizziness and **dry mouth** were reported.

Bellergal

The twice daily use of 40 mg of bellergal—a potent hypnotic-sedative combination of ergotamine tartrate, belladona alkaloids, and phenobarbitol—reduces hot flashes by 60% when compared to the placebo rate of 22%. This drug is one of the older synthetic remedies prescribed for hot flashes, due to its effects on the nervous system. It has the very undesirable effect of being addictive, and avoidance of alcohol is strongly advised.

Megestrol acetate

One of the newer drugs for relief of hot flashes, studied under rigorous clinical trial according to one source, in a 20 mg twice daily oral dose, megestrol acetate is considered to show high promise for use in both men and women. It is considered as a treatment for breast cancer in high continuous doses. Initial dosing is reported to start at 40 mg daily and then tapered up or down after a month with a maximum of 80 mg daily. Side effects noted were fluid retention and bloating.

Selective serotonin reuptake inhibitors (SSRIs)

As of 2008, attention was being paid to this class of drugs, especially to fluoxetine (Prozac), paroxetine (Paxil), and venlafaxine (Effexor). Venlafaxine is sometimes also notated as an norepinephrine serotonin reuptake inhibitor (NSRI). Norepinephrine is an adrenal hormone related to feelings of ambition and **depression**. By relieving deficits that may affect mood and hot flashes, these reuptake inhibitors were showing a 50% to 75% efficacy in decreasing hot flashes in 60% of women, making them better than trial placebo (22% to 30%) by about half. Eighty percent of the benefit was achieved in the first week. The noted dose on Paxil is 10 mg daily for the first week, followed by 20 mg daily thereafter. Dosing for Effexor was noted at 75 mg twice daily of a time released formula. The study using 75 mg followed studies using considerably less, 12.5 mg twice daily. Side effects include **sexual dysfunction**, and, according to one source, possible weight gain from increased carbohydrate craving.

Prognosis

Though some hot flashes for some women may be severe, occur over several years, be embarrassing, disruptive, mood altering, **fatigue** inducing, and correlated with other age-related deficiencies, they are not life threatening. The statistics, according to one source, that hot flashes respond to placebo in one-third to a half of all women, may mean that an average 40% reduction in hot flashes may be obtained by visiting a healthcare professional, allopathic or alternative, talking about concerns, and instituting lifestyle changes representing a kind of pampering or self care. In other words, hot flash sufferers may feel statistically justified in adopting new ways of living they might have been contemplating previously but have not yet adopted.

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Prevention

Hot flashes may represent an invitation or opportunity to experiment with new modalities. Prevention, in the strictest sense, is not a likely option unless one is a Mayan Indian woman or healthy male. However, many suggestions offer significant improvements in quality of life that may be helpful, including the following:

- Saliva sampling: Consider working with a healthcare professional who can offer advice and hormone testing of the bio-available levels through saliva sampling and who may also be able to quantitatively advise and monitor natural hormone replacement therapy. A postmenopausal saliva panel may be covered by insurance. Sampling intervals may vary according to need.
- Obtaining and maintaining optimum body weight: Adipose (fat) tissue stores estrogen which may complicate safe hormone replacement therapy, while making heat distribution more difficult. A deficiency of adipose tissue may add to stress and a lower immunity.
- Exercising regularly: Exercise not only tones the muscles and improves distribution of all hormones, it also reduces stress, builds endorphins (hormones related to feeling well), and quiets the nervous system.
- Avoiding dietary triggers: Sugar, spicy foods, caffeine, and alcohol may all adversely affect the ability of the hypothalamus to more normally regulate temperature.
- Avoiding life style triggers: Diet pills, sauna, hot tubs, hot showers, and smoking are all advised to be avoided.
- Wearing layered cotton clothing and using cotton bed linens: Breathable natural fibers or sport fibers that wick away perspiration may help transfer heat; layering more easily allows quicker responses to flashing and chilling.
- Meditating and breathing deeply: Also included in this category are yoga, hypnosis, massage, biofeedback techniques, visualization, and relaxation exercises. These techniques reduce stress and oppose or quiet the nerve pathways involved in increased triggering of hot flashes.
- Air conditioning: One source suggested liberal use of the air conditioner and even the freezer (at home and supermarket) when a hot flash happens; turning down the thermostat of the furnace in winter, as possible, was also suggested.

KEY TERMS

Bellergal—A potent combination of ergotamine tartrate (a blood vessel constricting substance often used for migraines), belladona alkaloids (a potentially poisonous substance with sedative and antispasmodic effects), and phenobarbitol (an hypnotic, long-acting sedative and anti-convulsant). Bellergal is one of the early synthetic patented formulations prescribed for relief of hot flashes due to its actions on the central nervous system, but as of 2008, avoided due to its addictive capacity.

Estrogen—One of the primary reproductive hormones in women and present in men. Three fractions of estrogen have been identified: E1 or estrone is moderately active; E2 or estradiol is the most potent; and, E3 or estriol is the least potent and most often recommended for use in natural hormone replacement therapy, often in an 80% to 10% to 10% combination of E3 to E1 and E2.

Hormone replacement therapy (HRT)—A term used for the supplementation of hormones in the treatment of hormone deficiency related symptoms and illnesses. HRT often uses synthetic, patented hormonal drugs. Natural soy or wild yam based hormone replacement therapy is also available using hormones molecularly identical to human hormones and, therefore, unpatentable.

Progesterone—A primary reproductive hormone in women that has an estrogen suppressing and pregnancy term supporting role. Natural progesterone levels often decline long before declining estrogen levels may produce hot flashes. Prior to estrogen replacement therapy, progesterone therapy may be recommended to balance estrogen and reduce the risk of estrogen related health risks like fibroids of breast and uterus, and breast or endometrial cancer.

Standardized—A process by which active ingredients in compounds are quantified to insure a desired level of potency.

Synergy—A condition in which the action of a sum of parts is greater than the individual actions of those parts added together, something like "one plus one is greater than two."

Resources

BOOKS

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Katherine E. Nelson, N.D.

Hou xiang *see* **Agastache**

Houndsbane *see* **Horehound**

Hoxsey formula

Definition

The Hoxsey formula is an herbal mixture named for the man who developed it and marketed it as a **cancer** cure during the 20th century. Harry Hoxsey developed a tonic that was taken internally and a powder that was applied to the skin. His treatment also included a special diet. Although supporters maintained that the Hoxsey treatment was effective, Hoxsey was sued by the American Medical Association for practicing medicine without a license. In addition, the United States Food and Drug Administration (FDA) in 1960 forced Hoxsey to stop selling the medicine and close his clinics in the United States. The treatment has been illegal in the United States since then but as of 2008 was offered at clinics in Tijuana, Mexico.

Origins

While Harry Hoxsey (1901–1974) is most associated with the herbal combination that bears his name. Hoxsey said that the formula was based on a remedy created by other family members. In 1840, his great-grandfather John Hoxsey observed the effect of wild plants on a horse that had a cancerous tumor on its leg. According to Harry, the horse ate wild plants, and the tumor disappeared in three months. The great-grandfather collected the herbs and mixed them with remedies that were used at the time to treat cancer. Those remedies included arsenic. Harry's father John was a veterinarian who began using the herbal formula to treat people for cancer.

Son Harry was a former coal miner with an eighth-grade education. During the 1920s, he began promoting the cancer remedy, a brown liquid tonic consisting of nine herbs and **potassium** iodide. Although he had no medical training, Hoxsey staged healing sessions and advertised the remedy in newspapers. He opened his first clinic in Taylorsville, Illinois, during the 1920s. In 1936, Hoxsey opened a clinic in Dallas, Texas. He also obtained a naturopath license. Dallas became the headquarters for the clinic that eventually operated branches in 17 states.

Cancer claims

Hoxsey claimed that the herbal combination worked well on **skin cancer** but was also effective on cancers affecting internal tumors in areas such as the lungs and bladder. The Hoxsey tonic supposedly eliminated toxins from the body, strengthened the immune system, and eliminated internal cancer. The powder applied to the skin was supposedly able to distinguish between malignant and nonmalignant skin. The treatment would come to include a diet that restricted foods that were said to interfere with the healing effects of the Hoxsey formula.

The Hoxsey formula was challenged for decades by organizations, including the American Medical Association (AMA). Criticism from the local AMA forced Hoxsey to close his first clinic in Illinois. The association was among the groups that accused Hoxsey of practicing medicine without a license. He closed the clinic and moved to another state. That set a pattern. Hoxsey was convicted and fined numerous times for practicing medicine without a license, according to the American Cancer Society.

Court cases

For decades, litigation pitted Hoxsey against what his supporters regarded as the establishment medical community. Some cases were dropped due to the testimony of people who said they were cured. Critics of the Hoxsey treatment pointed to cases in which reportedly cured people never had cancer. In a 1931 case, a man testified that he had received the treatment and learned later that he actually had barber's itch, according to *Time* magazine.

In 1949, Hoxsey responded to a negative article and sued the AMA, the editor of the *Journal of the American Medical Association*, and Hearst publications. Hoxsey

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sued for libel and slander. Although Hoxsey won the suit claiming that his character was harmed, the judge only awarded $1 to him.

The FDA also challenged Hoxsey, who long refused to reveal the ingredients of his formula. In 1950, court decisions about labeling requirements gave the FDA power to block the interstate shipping of Hoxsey's products. During a court hearing, Hoxsey revealed the ingredients, which led to cases in which researchers said the treatment was not effective. Hoxsey supplied case histories, but these did not satisfy the courts or the medical community. They maintained that full clinical research was needed.

By 1960, Hoxsey faced FDA lawsuits in the states where he had clinics. He closed the U.S. clinics and gave the formula to Mildred Nelson, his nurse. Nelson said that the Hoxsey treatment cured her mother's cancer in 1946. In 1963, the nurse opened a Hoxsey cancer clinic, the Bio-Medical Center, in Tijuana, Mexico.

Hoxsey was diagnosed with **prostate cancer** in 1967. According to the American Cancer Society, Hoxsey did not respond to his treatment and underwent traditional surgery. He died seven years later.

Aftermath

During the 1990s, the Bio-Medical Center treated about 1,200 people each year for cancer and other conditions, according to the University of Texas M. D. Anderson Cancer Center.

The Hoxsey formula was again the subject of litigation in 2005 when authorities learned that Virginia teenager Starchild Abraham Cherrix refused chemotherapy for **Hodgkin's disease**. Instead, Cherrix's family took him to Mexico where he received the Hoxsey treatment. His father told the *Washington Post* that after several months of treatment that the teenager's tumor growth had slowed.

The court case charged the teenager's parents with neglect. For some people, the litigation became an issue about whether the parents and teenager had the right to decide on a treatment. During litigation that went from juvenile court to county circuit court, the teenager stopped the Hoxsey treatment. The circuit court in 2006 ruled that the teenager did not have to undergo chemotherapy. In 2007, a Mississippi radiation oncologist reported that a final small tumor in the boy's lung appeared to be gone, according to the Associated Press.

Benefits

Although supporters maintained that the Hoxsey formula was an effective treatment for cancer, organizations, including the American Cancer Society and the University of Texas M. D. Anderson Cancer Center cautioned that additional scientific research was needed to determine whether the treatment was safe and effective for treating cancer in people.

Description

The Hoxsey treatment consists of a tonic for internal cancer and a topical mixture for skin cancer. During treatment, people follow a special diet.

The herbal ingredients of the Hoxsey brown tonic are: **licorice**, **red clover**, **burdock root**, stillingia root, **barberry**, cascara, prickly ash bark, **buckthorn** bark, and pokeroot.

The skin cancer treatments include a paste made of antimony trisulfide, **zinc** chloride, and **bloodroot**. The powder applied to the skin contains **sulfur** and talc.

People undergoing the Hoxsey treatment eliminate certain items from their diet because they supposedly block the effectiveness of the formula. They are supposed to avoid pork, vinegar, tomatoes, flour, carbonated beverages, and alcohol.

Preparation

The type of preparation and treatment depend on the type of cancer. That would also determine the length of the treatment.

Precautions

No clinical trials have been performed to determine whether the Hoxsey formula is a safe and effective method for treating cancer. Some ingredients in the formula could produce side effects that include burning and **nausea**. The Hoxsey treatment is illegal in the United States, and organizations, including the American Cancer Society, warn people not to undergo it. Medical organizations in the United States caution that the treatment should not take the place of conventional treatment.

Furthermore, women who are pregnant and nursing mothers should not use any form of the Hoxsey treatment. Moreover, red clover has an estrogenic activity, meaning that it produces estrogen. Women with estrogen-positive **breast cancer** should not take red clover.

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Side Effects

The ingredients in the Hoxsey formula may cause side effects ranging from the internal reaction of **diarrhea** to the external reaction of scarred skin.

Sloan-Kettering Memorial Hospital labeled buckthorn a "violent laxative" that could cause nausea, **vomiting**, diarrhea, abdominal **pain**, dehydration, **anxiety**, decreased respiration, and trembling.

Cascara is also a laxative that Sloan-Kettering cautioned may cause diarrhea, abdominal pain, cramping, vomiting, discoloration of urine, fluid and electrolyte imbalance, osteomalacia (softening of bones), steatorrhea (fat in feces), and vitamin and mineral deficiencies.

Licorice may interact with a person's hormones and cause imbalances in the retention of water, **sodium**, and potassium, according to Sloan-Kettering. This reaction leads to high blood pressure, **fatigue**, muscle pain, cardiac arrhythmia, low levels of potassium in the blood, and decreased libido, according to numerous reports in the scientific literature. Also, when taken regularly it can cause pregnant women to give birth too early.

Pokeweed is a poisonous plant that could cause nausea, vomiting, diarrhea, and stomach cramps, according to the American Cancer Society. Sloan-Kettering warned that consuming pokeweed has been associated with illnesses that required hospitalization. It also caused the deaths of children.

Red clover could increase the risk of bleeding for people who take blood-thinning medications.

Organizations, including the American Cancer Society, caution that the Hoxsey paste and powder are escharotics, substances that could burn, scar, or disfigure the skin.

High levels of **iodine** from potassium iodide may cause pimples, excessive secretion from the eyes of nose, **impotence**, and inflammation of the salivary glands, according to Sloan-Kettering.

Furthermore, ingredients in the Hoxsey formula may interact with medications. For example, potassium iodide could decrease the effectiveness of anticoagulant medications.

Research and general acceptance

As of February 2008, the American Cancer Society and Sloan-Kettering had pointed out that diet is an important component of preventing cancer. Currently, it is unknown if diet will reverse the course of cancer, according to Sloan-Kettering. Both organizations warned against the treatment.

KEY TERMS

Escharotic—A corrosive or caustic substance.

The Hoxsey treatment has been the subject of study at the M. D. Anderson Cancer Center. That study includes the review of research and reports. The center pointed out that the congressional Officer of Technology Assessment (OTA) noted that animal research indicated that many herbs in the Hoxsey tonic had anti-tumor effects. However, the OTA and other organizations maintained that there was not sufficient acceptable scientific evidence that the Hoxsey treatment was effective as a cancer treatment for people. The OTA also cautioned about the side effects of some formula ingredients.

Training and Certification

The Hoxsey treatment was illegal in the United States as of February 2008. As a result, there was no training and certification program in the United States for people who provide the treatment.

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ORGANIZATIONS

American Cancer Society, (800) 227-2345, www.cancer.org.
Herb Research Foundation, 4140 Fifteenth St., Boulder, CO, 80304, (303) 449-2265, http://www.herbs.org.
Memorial Sloan-Kettering Cancer Center, 1275 York Ave., New York, NY, 10065, (212) 639-2000, http://www.mskcc.org.

Liz Swain

Huang qi *see* **Astragalus**
Huckleberry *see* **Bilberry**

KEY TERMS

Aura—An energy field surrounding the human body, discernible by its various colors.

Gesundheit—A German expression wishing good health, usually used when a person sneezes.

Immunosuppressive—Anything that acts to suppress or weaken the body's immune system, thus making it more susceptible to disease.

Humor therapy

Definition

Humor therapy is the art of using humor and laughter to help heal people with physical or mental illness.

Origins

The benefits of humor therapy were acknowledged as far back as the book of Proverbs in the Old Testament, which contains verses like Prov. 17:22: "A cheerful heart is a good medicine, but a downcast spirit dries up the bones." The earliest historical reference to humor therapy is from the fourteenth century, when French surgeon Henri de Mondeville wrote, "Let the surgeon take care to regulate the whole regimen of the patient's life for joy and happiness, allowing his relatives and special friends to cheer him, and by having someone tell him jokes." In the sixteenth century, Martin Luther used a form of humor therapy as part of his pastoral counseling of depressed people. He advised them not to isolate themselves but to surround themselves with friends who could joke and make them laugh. Many of Luther's own letters to other people include playful or humorous remarks.

Modern humor therapy dates from the 1930s, when clowns were brought into hospitals to cheer up children hospitalized with polio. In his 1979 book, *Anatomy of an Illness*, author Norman Cousins brought the subject of humor therapy to the attention of the medical community. Cousins, himself a physician, details how he used laughter to help ease his **pain** while undergoing treatment for rheumatoid arthritis of the spine (ankylosing spondylitis.) The benefits of laughter in treating the sick captured the public's attention in the 1998 movie *Patch Adams*, starring Robin Williams as real-life doctor Hunter "Patch" Adams. The movie is based on Adams' experiences treating the poor in rural West Virginia as related in his 1983 book *Gesundheit!*

Benefits

It may seem difficult to measure the benefits of laughter in medicine but a number of clinical studies have helped verify the adage that laughter is the best medicine. In general, laughter improves the physical, mental, emotional, and spiritual health of individuals. Laughter appears to release tension in the diaphragm and relieve pressure on the liver and other internal organs. It stimulates the immune system, reduces stress, and helps balance the body's natural energy fields, or auras. People who have developed a strong sense of humor generally have a better sense of well-being and control in their lives.

A strong advocate of humor therapy is Dr. Michael R. Wasserman, president and chief medical officer of GeriMed Of America, Inc., a primary care physician management company for seniors. "A few years ago I came down with **pneumonia**, pulled out videotapes of *I Love Lucy* reruns and laughed myself back to good health," he said. "Clearly, humor and laughter have a positive effect on one's attitude and health overall. While we don't know all of the specifics, our immune system appears to benefit from these emotions."

Description

Humor therapy is used in both mainstream and alternative medicine. It can take many forms but generally it is simply the recognition by physicians, nurses, and other health care practitioners of the value of mixing humor and laughter with medication and treatment. It is especially important with children and the elderly. Patients can also help themselves to heal by adding more humor and laughter to their lives.

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Hospitals, hospices, nursing homes, and other medical care facilities can also turn to professionals for help in bringing humor to their patients. One example is the Big Apple Circus Clown Care Unit, which has programs in hospitals throughout the New York metropolitan area and major children's hospitals throughout the United States, including Children's Hospital in Boston. Professional clowns perform three days a week at the bedsides of hospitalized children to help ease the stress of serious illnesses. The clowns use juggling, mime, magic tricks, music, and gags to promote the healing power of humor. Instead of stethoscopes, thermometers, and hypodermics, the "doctors of delight" make their "clown rounds" with Groucho Marx disguises, funny hats, and rubber chickens.

Preparations

No advance preparation is required, except possibly a good repertoire of jokes and gags for the therapist.

Precautions

Not everyone will appreciate humor therapy. Some people may consider humor for the sick or injured as inappropriate or harmful. Therefore, it is important to know or sense when humor will be therapeutic and when it will be inappropriate. It should be used cautiously at first in situations in which the sensitivity of the person it is directed at is uncertain or unknown.

Side effects

The only adverse side effects of humor therapy is that it can cause mental hurt, sadness, and alienation in persons who are not receptive to it, or if it is used insensitively.

Research and general acceptance

Humor therapy is widely accepted in the alternative health community and is finding growing acceptance with mainstream health practitioners, especially registered nurses. Numerous scientific studies done in a clinical setting support the benefits of humor therapy. Two 1989 studies done at the Loma Linda (CA) University School of Medicine showed that laughter stimulates the immune system, counteracting the immunosuppressive effects of stress. These findings have been supported by other studies at the UCLA Medical School Department of Behavioral Medicine, Ohio State University School of Medicine, and the VA Medical Center in San Diego.

While several studies have demonstrated that humor therapy raises the level of salivary immunoglobin A, they have also been challenged. Other research focuses on the effects of humor therapy on natural killer (NK) cell assays, which are considered to give clearer and more replicable results. The general conclusion is that laughter has the potential to reduce stress and stress hormone levels, consequently reducing their effects on the immune system. Humor therapy may well be a useful complementary therapy for oncology patients.

Training and certification

Although no official training or certification is required, there are a few institutions that teach humor therapy. Further information is available from the American Association for Therapeutic Humor listed below.

Resources

BOOKS

Adams, Patch and Maureen Mylander. *Gesundheit!: Bringing Good Health to You, the Medical System, and Society Through Physician Service, Complementary Therapies, Humor, and Joy*. Rochester, VT: Inner Traditions International Ltd., 1998 (Revised).

Klein, Allen. *The Courage to Laugh: Humor, Hope, and Healing in the Face of Death and Dying*. Boston: J.P. Tarcher, 1998.

Wooten, Patty. *Compassionate Laughter: Jest for Your Health!* Salt Lake City: Commune-A-Key, 1996.

ORGANIZATIONS

American Association for Therapeutic Humor. 222 S. Meramec, Suite 303. St. Louis, MO 63105. (314) 863-6232. http://www.aath.org.

International Center for Health & Humor. 2930 Hidden Valley Road, Edmond, OK 73013. (405) 341-8115. http://www.humorandhealth.com.

OTHER

Humor and Health Journal. Bimonthly newsletter. P.O. Box 16814. Jackson, MS 39236. (601) 957-0075.

Jest for the Health of It Services. Consultant. Patty Wooten. P.O. Box 8484. Santa Cruz, CA 95061. (831) 460-1600. http://www.jesthealth.com.

Ken R. Wells

Huna

Definition

Huna is an esoteric Polynesian psychology that claims to use the powers of the mind to accomplish healing and spiritual development. Max Freedom

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Long, who rediscovered Huna in the 1920s, defined it as a system of religious psychiatry because it contains elements of religion, psychology, and psychic science.

Origins

Huna practitioners believe their teachings are ancient and sacred, although at least one writer has claimed they actually have modern origins. In the Hawaiian language, the word *huna* means "secret" or "that which is hidden," referring to a tradition of concealing these teachings. The word is also said to be taken from *kahuna*, a priest or teacher who was the "keeper of the secret." Huna has traditionally been passed on through oral communication and in chants rather than in writing.

Christian missionaries to the Hawaiian Islands outlawed Huna in the 19th century. Max Freedom Long, who founded the Huna Fellowship in 1945, spent years decoding the language of Huna knowledge. He published eight books on Huna between the 1920s and his death in 1971. Serge Kahili King, a non-Polynesian kahuna, founded One Order of Huna International in 1973.

Benefits

Huna claims to offer the following benefits to its adherents:

- Becoming a complete person psychologically.
- Solving personal problems, including financial or social issues.
- Having a higher level of physical, emotional, and spiritual energy.
- Handling the demands and stresses of daily life more effectively.
- Acquiring the ability to heal oneself and others.
- Learning how to accumulate mana (vital force) in order to attain personal goals.
- Growing spiritually.
- Changing one's future.

Description

The specific teachings and customs associated with Huna vary somewhat from island to island. All agree, however, on the concept of three spirits or minds in the human being. According to Huna, the complete being consists of a physical body inhabited by two of the three minds: the "low self" which is below the level of consciousness, and the "middle self" which is the conscious mind. The middle self is what others perceive as one's personality. The third spirit or mind, the High Self, is outside the body. Each person has a transparent shadow body that completely duplicates the physical body. This shadow body is called the aka. The aka is like a pattern or blueprint that connects the three selves. It has a sticky and stretchy quality that allows it to form connections between an individual and another person or object. When someone touches, looks at, or even thinks of something, a thread or cord from the aka attaches to it, forming an energy channel between the person and another person or object. Illness develops when a conflict exists between the conscious mind and the patterns of the aka.

The third mind or self, the High Self, is not God but a person's divine connection with God. Ideally all three selves or minds in a person are in continual contact with one another. The low self is the communication link between the middle self and the High Self. It obtains information directly from the senses and is the seat of the emotions. It has a limited ability to reason and reacts to events only on the basis of previous programming, even if this programming has been incorrect or negative. Fear, anger, or negative programming can lead to blockages in the low self, and this can interrupt communication with the High Self. The function of the kahuna is to remove these interferences. Kahunas use a wide range of techniques including telepathy, rituals, massage, body stroking, herbs, dream work to clear the mind of limiting beliefs and fears, meditative movements known as *kalana hula,* and a variety of other self-development techniques to establish harmony among people, objects, locations, and circumstances. One such self-development technique is *Ho'oponopono*, which refers to counseling and mediation to balance relationships.

The three minds or selves use a form of subtle energy called mana, which is stored in the aka. The low self takes energy from food and turns it into mana, or basic life energy. The kahunas, who serve as conduits for the healing qualities of mana, use breathing techniques to increase a person's mana. The basic breathing technique involves drawing a deep breath, holding it, and willing the mana into a body part that needs healing, into the hands, or into an object like a crystal or talisman. A person can also increase his or her mana by living correctly. Huna emphasizes the importance of living and speaking positively, and of doing no harm to others.

Practitioners of Huna also emphasize that their way of life is accessible to and may be practiced by everyone. In other words, it does not depend on having unusual psychic gifts or on joining a small group of

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KEY TERMS

Aka—In Huna, the shadow body of the low self. The aka forms threads or cords between the low self and other persons, objects, or the High Self. These aka threads serve as energy channels.

High Self—The Huna term for the level of the personality that functions as a guardian spirit and forms the person's connection with God.

Kahuna—A native Hawaiian priest or healer.

Low self—The Huna term for the subconscious mind. The word "low" does not mean inferior in value, but refers only to what is below the level of consciousness.

Mana—The Hawaiian word for life energy. According to Huna, mana can be transferred from the conscious mind into parts of the body needing healing or into talismans or crystals to charge them with energy.

Middle self—The Huna term for the conscious mind, including the ability to reason. The middle self is what others recognize as an individual's personality.

"chosen" initiates. All humans have the basic capacity to practice and benefit from Huna.

Precautions

As of 2008, Huna is considered an unproved therapy for major physical disorders and should not be used to the exclusion of proven medical treatments. Huna is said to promote general wellness, and should therefore be used only in conjunction with other healing methods in cases of potentially serious illness.

Side effects

Huna healing has no known physical side effects. The system's emphasis on speaking only positive things, being of service to others, and not hurting others might well have beneficial side effects in a person's life. In addition, the Huna Fellowship maintains that Huna does not require anyone to give up other religious affiliations or belief systems. This understanding minimizes the possibility of emotional **stress** caused by conflicting loyalties.

Research and general acceptance

The healing methods of Huna are unproved by medical research, although medical practitioners acknowledge that benefits may be achieved through a **placebo effect**.

Training and certification

Training consists of brief courses (usually less than one week) offered in Hawaii and elsewhere. Individuals can also self-teach the method through the use of books, videos, and other teaching materials that are available from Huna Research. Huna healers and teachers can be found in many countries of the world.

Resources

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Hydrotherapy

Definition

Hydrotherapy, or water therapy, is the use of water (hot, cold, steam, or ice) to relieve discomfort and promote physical well-being.

Origins

The therapeutic use of water has a long history. Ruins of an ancient bath were unearthed in Pakistan and date as far back as 4500 B.C. Bathhouses were an essential part of ancient Roman culture. The use of steam, baths, and aromatic massage to promote well being is documented since the first century. Roman physicians Galen and Celsus wrote of treating patients with warm and cold baths in order to prevent disease.

By the seventeenth and eighteenth centuries, bathhouses were extremely popular with the public throughout Europe. Public bathhouses made their first American appearance in the mid 1700s.

In the early nineteenth century, Sebastien Kneipp, a Bavarian priest and proponent of water healing,

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VINZENZ PRIESSNITZ (1799–1851)

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Hydrotherapy inventor Vinzenz Priessnitz was the son of a Silesian farmer from a remote Austrian territory in the Jeseniky Mountains. From the age of 12, Priessnitz dutifully provided for his blind father, his elderly mother, and his sister. His formal education was sporadic at best. However, Priessnitz possessed a level head and a high degree of intelligence along with a keen and active mind. As he matured he became extremely aware of his surroundings in nature.

At age 16, Priessnitz fell from a horse and was seriously hoofed by the animal. He received the morbid prognosis that he might be crippled at best, or might die at worst. He set to treating his own chest wound with cold packs, in emulation of a doe that he had once observed bathing a wound in a cool mountain stream. The hydrotherapy regimen proved highly effective and drew considerable attention to his small hometown of Gräfenberg. In 1822 he rebuilt the family home, renovating its wooden frame into a solid brick spa structure. The spa, known as the castle, housed as many as 1,500 guests each year by 1939. Among the guests were medical professionals who were intent upon exposing the therapy as a sham.

Detractors notwithstanding, word of the simple and effective treatment spread to Vienna, where Priessnitz traveled on occasion to provide counsel at the emperor's court. Priessnitz, for his remarkable discovery, received the Austrian Gold Civil Merit Medal First Class, the highest civilian honor of the Austrian government.

Priessnitz died on November 28, 1851. He was survived by a wife, Zofie Priessnitz, and a young son, Vinzenz Pavel. Joseph Schindler took over the operation of the spa at Gräfenberg following the death its founder.

began treating his parishioners with cold water applications after he himself was cured of **tuberculosis** through the same methods. Kneipp wrote extensively on the subject, and opened a series of hydrotherapy clinics known as the Kneipp clinics, which are still in operation today. Around the same time in Austria, Vincenz Priessnitz was treating patients with baths, packs, and showers of cold spring water. Priessnitz also opened a spa that treated more than 1,500 patients in its first year of operation, and became a model for physicians and other specialists to learn the techniques of hydrotherapy.

Benefits

Hydrotherapy can soothe sore or inflamed muscles and joints, rehabilitate injured limbs, lower fevers, soothe headaches, promote **relaxation**, treat **burns** and **frostbite**, ease labor pains, and clear up skin problems. The temperature of water used affects the therapeutic properties of the treatment. Hot water is chosen for its relaxing properties. It is also thought to stimulate the immune system. Tepid water can also be used for **stress** reduction, and may be particularly relaxing in hot weather. Cold water is selected to reduce inflammation. Alternating hot and cold water can stimulate the circulatory system and improve the immune system. Adding herbs and **essential oils** to water can enhance its therapeutic value. Steam is frequently used as a carrier for essential oils that are inhaled to treat respiratory problems.

Since the late 1990s, hydrotherapy has been used in critical care units to treat a variety of serious conditions, including such disorders of the nervous system as Guillain-Barré syndrome.

Description

Water can be used therapeutically in a number of ways. Common forms of hydrotherapy include:

- Whirlpools, Jacuzzis, and hot tubs. These soaking tubs use jet streams to massage the body. They are frequently used by physical therapists to help injured

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KEY TERMS

Contact dermatitis—Skin irritation as a result of contact with a foreign substance.

Episiotomy—An incision made in the perineum during labor to assist in delivery and to avoid abnormal tearing of the perineum.

Essential oil—A volatile oil extracted from the leaves, fruit, flowers, roots, or other components of a plant and used in aromatherapy, perfumes, foods, and beverages.

Hubbard tank—A large water tank or tub used for underwater exercises.

Jacuzzi—A trademark name for a whirlpool bath.

Sitz bath—A bathtub shaped like a chair, which allows a person to bathe in a sitting position so that only the hips and buttocks are immersed. The name comes from the German word for "sit."

patients regain muscle strength and to soothe joint and muscle pain. Some midwives and obstetricians also approve of the use of hot tubs to soothe the pain of labor.

- Pools and Hubbard tanks. Physical therapists and rehabilitation specialists may prescribe underwater pool exercises as a low-impact method of rebuilding muscle strength in injured patients. The buoyancy experienced during pool immersion also helps ease pain in such conditions as arthritis. The Arthritis Foundation has put together a set of Aquatic Program exercises that have been shown to improve isometric strength and range of motion in osteoarthritis patients.
- Baths. Tepid baths are prescribed to reduce a fever. Baths are also one of the oldest forms of relaxation therapy. Aromatherapists often recommend adding essential oils of lavender (*Lavandula angustifolia*) to a warm to hot bath to promote relaxation and stress reduction. Adding Epsom salts (magnesium sulfate) or Dead Sea salts to a bath can also promote relaxation and soothe rheumatism and arthritis.
- Showers. Showers are often prescribed to stimulate the circulation. Water jets from a shower head are also used to massage sore muscles. In addition, showering hydrotherapy has been shown to be preferable to immersion hydrotherapy for treating burn patients.
- Moist compresses. Cold, moist compresses can reduce swelling and inflammation of an injury. They can also be used to cool a fever and treat a headache. Hot or warm compresses are useful for soothing muscle aches and treating abscesses.
- Steam treatments and saunas. Steam rooms and saunas are recommended to open the skin pores and cleanse the body of toxins. Steam inhalation is prescribed to treat respiratory infections. Adding botanicals to the steam bath can increase its therapeutic value.
- Internal hydrotherapy. Colonic irrigation is an enema that is designed to cleanse the entire bowel. Proponents of the therapy say it can cure a number of digestive problems. Douching, another form of internal hydrotherapy, directs a stream of water into the vagina for cleansing purposes. The water may or may not contain medications or other substances. Douches can be self-administered with kits available at most drug stores.

Preparations

Because of the expense of the equipment and the expertise required to administer effective treatment, hydrotherapy with pools, whirlpools, Hubbard tanks, and saunas is best taken in a professional healthcare facility, and/or under the supervision of a healthcare professional. However, baths, steam inhalation treatments, and compresses can be easily administered at home.

Bath preparations

Warm to hot bath water should be used for relaxation purposes, and a tepid bath is recommended for reducing fevers. Herbs can greatly enhance the therapeutic value of the bath for a variety of illnesses and minor discomforts.

Herbs for the bath can be added to the bath in two ways—as essential oils or whole herbs and flowers. Whole herbs and flowers can be placed in a muslin or cheesecloth bag that is tied at the top to make an herbal bath bag. The herbal bath bag is then soaked in the warm tub, and can remain there throughout the bath. When using essential oils, add five to 10 drops of oil to a full tub. Oils can be combined to enhance their therapeutic value. Marjoram (*Origanum marjorana*) is good for relieving sore muscles; **juniper** (*Juniperus communis*) is recommended as a detoxifying agent for the treatment of arthritis; **lavender**, ylang ylang (*Conanga odorata*), and **chamomile** (*Chamaemelum nobilis*) are recommended for stress relief; cypress (*Cupressus sempervirens*), **yarrow** (*Achillea millefolium*), geranium (*Pelargonium graveolens*), clary **sage** (*Savlia sclaria*), and myrtle (*Myrtus communis*) can promote

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healing of **hemorrhoids**; and spike lavender and juniper (*Juniperus communis*) are recommended for rheumatism.

To prepare salts for the bath, add one or two handfuls of Epsom salts or Dead Sea salts to boiling water until they are dissolved, and then add them to the tub.

A sitz bath, or hip bath, can also be taken at home to treat hemorrhoids and promote healing of an episiotomy. There is special apparatus available for taking a seated sitz bath, but it can also be taken in a regular tub partially filled with warm water.

Steam inhalation

Steam inhalation treatments can be easily administered with a bowl of steaming water and a large towel. For colds and other conditions with nasal congestion, aromatherapists recommend adding five drops of an essential oil that has decongestant properties, such as **peppermint** (*Mentha piperita*) and **eucalyptus** blue gum (*Eucalyptus globulus*). Oils that act as expectorants, such as myrtle (*Myrtus communis*) or **rosemary** (*Rosmarinus officinalis*), can also be used. After the oil is added, the individual should lean over the bowl of water and place the towel over head to trap the steam. After approximately three minutes of inhaling the steam, with eyes closed, the towel can be removed.

Other herbs and essential oils that can be beneficial in steam inhalation include:

- Tea tree oil (*Melaleuca alternaifolia*) for bronchitis and sinus infections.
- Sandalwood (*Santalum album*), virginian cedarwood (*Juniperus virginiana*), and frankincense (*Boswellia carteri*) for sore throat.
- Lavender (*Lavandula angustifolia*) and thyme (*Thymus vulgaris*) for cough.

Compresses

A cold compress is prepared by soaking a cloth or cotton pad in cold water and then applying it to the area of injury or distress. When the cloth reaches room temperature, it should be resoaked and reapplied. Applying gentle pressure to the compress with the hand may be useful. Cold compresses are generally used to reduce swelling, minimize bruising, and to treat headaches and **sprains**.

Warm or hot compresses are used to treat abscesses and muscle aches. A warm compress is prepared in the same manner as a cold compress, except steaming water is used to wet the cloth instead of cold water. Warm compresses should be refreshed and reapplied after they cool to room temperature.

Essential oils may be added to moist compresses to increase the therapeutic value of the treatment. Peppermint, a cooling oil, is especially effective when added to cold compresses. To add oils to compresses, place five drops of the oil into the bowl of water the compress is to be soaked in. Never apply essential oils directly to a cloth, as they may irritate the skin in undiluted form.

Precautions

Individuals with paralysis, frostbite, or other conditions that impair the nerve endings and cause reduced sensation should take hydrotherapy treatments only under the guidance of a trained hydrotherapist, physical therapist, or other appropriate healthcare professional. Because these individuals cannot accurately sense temperature changes in the water, they run the risk of being seriously burned without proper supervision. Diabetics and people with **hypertension** should also consult their healthcare professional before using hot tubs or other heat hydrotherapies.

Hot tubs, Jacuzzis, and pools can become breeding grounds for bacteria and other infectious organisms if they are not cleaned regularly, maintained properly, kept at the appropriate temperatures, and treated with the proper chemicals. Individuals should check with their healthcare provider to ensure that the hydrotherapy equipment they are using is sanitary. Those who are using hot tubs and other hydrotherapy equipment in their homes should follow the directions for use and maintenance provided by the original equipment manufacturer.

Certain essential oils should not be used by pregnant or nursing women or by people with specific illnesses or physical conditions. Individuals suffering from any chronic or acute health condition should inform their healthcare provider before starting treatment with any essential oil.

Such essential oils as cinnamon leaf, juniper, lemon, eucalyptus blue gum, peppermint, and **thyme** can be extremely irritating to the skin if applied in full concentration. Oils used in hydrotherapy should always be diluted in water before they are applied to the skin. Individuals should never apply essential oils directly to the skin unless directed to do so by a trained healthcare professional and/or aromatherapist.

Colonic irrigation should be performed only by a healthcare professional. Pregnant women should never douche, as the practice can introduce bacteria

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into the vagina and uterus. They should also avoid using hot tubs without the consent of their healthcare provider.

The vagina is self-cleansing, and douches have been known to upset the balance of vaginal pH and flora, promoting **vaginitis** and other **infections**. Some studies have linked excessive vaginal douching to increased incidence of **pelvic inflammatory disease** (PID).

Side effects

Most forms of hydrotherapy are well tolerated. There is a risk of allergic reaction (also known as **contact dermatitis**) for some patients using essential oils and herbs in their bath water. These individuals may want to test for allergic sensitization to herbs by performing a skin patch test (i.e., rubbing a small amount of diluted herb on the inside of their elbow and observing the spot for redness and irritation). People who experience an allergic reaction to an essential oil should discontinue its use and contact their healthcare professional for further guidance.

The most serious possible side effect of hydrotherapy is overheating, which may occur when an individual spends too much time in a hot tub or Jacuzzi. However, when properly supervised, this is a minimal risk.

Research and general acceptance

Hydrotherapy treatments are used by both allopathic and complementary medicine to treat a wide variety of discomforts and disorders. Not as well accepted are invasive hydrotherapy techniques, such as colonic irrigation, enemas, and douching. These internal cleansing techniques can actually harm an individual by upsetting the natural balance of the digestive tract and the vagina. Most conventional medical professionals agree that vaginal douches are not necessary to promote hygiene in most women, and can actually do more harm than good.

Training and certification

Hydrotherapy is practiced by a number of physical therapists, medical doctors (especially those specializing in rehabilitation), nurses, and naturopathic physicians. Medical doctors, physical therapists, and nurses are licensed throughout the United States. Naturopaths are licensed in a number of states. Aromatherapists, who frequently recommend water-based treatments with herbs and essential oils, are not licensed, although there are certification programs available for practitioners.

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American Association of Naturopathic Physicians. 8201 Greensboro Drive, Suite 300, McLean, Virginia 22102. (206) 298-0126. http://naturopathic.org

Canadian Naturopathic Association/Association canadienne de naturopathie. 1255 Sheppard Avenue East at Leslie, North York, ON M2K 1E2. (800) 551-4381 or (416) 496-8633. http://www.naturopathicassoc.ca.

Paula Ford-Martin
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Hyperactivity *see* **Attention-deficit hyperactivity disorder**

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Hypercortisolemia

Definition

Cortisol is an essential glucocorticoid hormone, a sub-group of steroid hormones, the major hormone secreted by the adrenal glands. Hormones are messenger substances, substances produced in one gland or area of the body that move through the blood and stimulate activity in other glands or areas. Glucocorticoid hormones affect carbohydrate and protein metabolism. Steroid hormones are hormones related to **cholesterol**. Hypercortisolemia is high amounts of circulating cortisol and may be a pathological or non-pathological condition.

Description

Pathological hypercortisolemia, or Cushing's Syndrome, named after the United States surgeon, Harvey Cushing (1869–1939), may result from a **lung cancer**, tumor of the pituitary or adrenal glands, or from kidney failure. Non-pathological hypercortisolemia is a normal response of **pregnancy**, and to traumas, such as accidents or surgery (including circumcision, studies show), some forms of **depression** and **stress**. Over time, continued exposure to trauma and stress may produce chronic hypercortisolemia, and result in serious, long term, debilitating illness.

KEY TERMS

Circadian—Events that occur on a 24 hour rhythmic cycle; a biological clock.

Diurnal—Events that happen in the daytime, daily; associated with circadian rhythms.

Feedback response—A response to information carried back to the brain, or to other areas or glands from target tissues that generates a follow up response.

Ketoconazole—An antifungal medication.

Osteoporosis—A condition referring to bone which is thinned and weakened; loss of bone mass. It results from the process of osteopenia, or bone loss.

Pathological, or, non-pathological—Terms indicating whether a condition is considered a disease state.

Prognosis—Referring to the expected outcome of a disease and its treatment.

Target tissues—Tissues specifically receptive to a given hormone.

Tricyclics—A type of antidepressant; Elavil, for example.

Causes and symptoms

The natural regulation of cortisol is governed by a circular feedback response system. Output is initiated when pituitary gland secretions of adrenocorticotropin hormone (ACTH) travel to and stimulate the adrenal glands, located atop the kidneys near the middle of the upper back. From the adrenals, cortisol travels to its target tissues, initiating a series of reactions known as the "flight-or-fight" response. Information from these target tissues is monitored by the brain. If the messages received tell the brain that more help is needed, the pituitary gland is stimulated to secrete more ACTH, which stimulates increased secretion of cortisol. The most significant feedback factor is stress. When stress levels are reported to the brain as high, high levels of cortisol are released in response. When stress remains high indefinitely, cortisol may also remain high indefinitely, producing a series of biochemical, physiological and even anatomical reactions.

Normally, cortisol output has a diurnal and circadian rhythm, rising in the morning, falling at night, and changing with the seasons. Changes are work-sleep cycles affect this rhythm, and changes in the rhythm affect night time sleep patterns. Changes in the length of daylight hours, blindness and loss of consciousness also affects the rhythm.

Cortisol target tissues include:

- liver
- bone
- blood vessels
- kidney
- muscle
- brain
- immune system

Long term exposure to cortisol, whether natural or synthetic—from steroid drugs such as Prednisone, Dexamethasone (Decadron), and Methylprednisone (Medrol)—may eventually result in changes such as **osteoporosis**, muscle weakening and wasting, high blood pressure, increased abdominal fat deposition, immune dysfunction, steroid-induced diabetes, and cardiovascular disease. Another serious consequence may be the eventual **fatigue** and failure of the adrenal glands. Cushing's syndrome classic symptoms include,

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in addition to "normal" longterm symptoms, a "moon face" (rounded), thinning of the skin accompanied by purple or pink stretch marks and easy bruising, **acne**, increased facial and body hair and decreased scalp hair in women, and fatigue.

Diagnosis

Initial diagnosis may be made through the office of a family practice physician or internist on the basis of signs and symptoms, physical examination, and lab work including testing levels of circulating cortisol. Three types of testing are available to check cortisol levels: 24-hour urine collection; blood testing; and, saliva sampling. The 24-hour urine collection test is done at home, beginning after the first urination of the morning and finishing after the first urination of the following day. This test can be done on infants. No special preparation is necessary. The test is described as not uncomfortable. Special considerations were reported to include emotional or physical stress, and medications: lithium, diuretics, estrogen, tricyclic antidepressants, ketoconazole, and glucocorticoids. Blood testing requires a visit to a lab, where blood is drawn and then analyzed. This test can be performed on infants, children and adults. Preparation for the test may include discontinuation of medications, similar to those medications listed above, as advised by one's healthcare provider. Some people experience **pain** or trauma with a blood draw, which may effect test results. Results may also be affected by the timing of the blood draw, since cortisol normally varies rhythmically. Risks of a blood draw include bruising, pain, excessive bleeding, infection, fainting or the need for multiple punctures. Saliva sampling is done at home by collecting four samples at specific times of day. Unlike the urine collection method that produces a daily average, or the blood test that produces a single spot sampling, saliva sampling produces a time-wave pattern for a more amplified diagnosis. Preparation includes discontinuation of medications listed with the other two methods, as well as a short list of foods and drinks, antacids, tooth brushing, and **smoking** prior to sampling. Cost comparisons were not reported. Test results may suggest follow up care with an endocrinologist, a specialist in glandular and hormonally related disease, for further testing and diagnosis.

Treatment

Preventive alternative care may focus on stress reduction, primarily. Since stress may be induced by emotional demands, dietary and nutritional imbalances, sub-clinical illness (illness which may not have fully shown itself), and physical inactivity, an alternative minded medical doctor, a licensed naturopathic physician, or other professional alternative healthcare provider may first work to re-establish balance through lifestyle changes specific to individual need. Treatment may include counseling; dietary and nutritional therapies; energy therapies, such as **Reiki**, Tai-chi, Qi Gong, **chakra balancing** or Healing Touch; **Traditional chinese medicine**, including chinese herbals and **acupuncture**; **chiropractic**; **Ayurvedic medicine**; environmental medicine; **homeopathy**; **relaxation** therapy; **biofeedback**; craniosacral work; massage; **exercise** therapies; **shamanism**; and, faith based therapies, including **prayer**, **meditation**, **yoga** and other spiritual exercises. Dietary supplement products to block cortisol or correct underlying dietary and nutritional insufficiencies are also being advertised. Assistance from a professional healthcare provider is recommended.

Allopathic treatment

Initial allopathic care may focus on antidepressants, hypoglycemics (blood sugar lowering), sedatives, or anti-hypertensives (blood pressure lowering), medications to correct underlying or related imbalances. Discontinuance of steroidal medications such as Prednisone, Dexamethasone (Decadron), and Methylprednisone (Medrol) may be warranted or advised. Treatment may also include higher protein recommendations to combat muscle wasting, or therapies that support kidney function.

Prognosis

In hypercortisolemia that has not progressed to serious disease, prognosis may be very good when committed changes in lifestyle are made. Prognosis may be further improved when medications are avoided that either add further imbalance, or overlook or disguise an underlying cause, thereby adding further stress. In Cushing's syndrome, or where hypercortisolemia has progressed to chronic disease, prognosis may be complicated by a need for difficult surgery, chemotherapy, or radiation. Follow up supplemental administration of cortisol may be required. Where surgery or other direct control of adrenal output is not an option, administration of cortisol output suppressing medications may be necessary.

Prevention

Given that stress is the single most influential feedback signal to the brain, a reasonable conclusion is that stress reduction is the single most influential prevention. Lifestyle changes, strategies, and therapies

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that reduce or eliminate stress, directly by reducing burden, or indirectly by improving underlying health, are key. One theory in medicine is that if preventive intervention can be made before an organ or gland is exhausted, especially if supportive, strengthening or tonifying remedies and therapies are also employed, good health can be restored, and a higher quality of life preserved.

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Katy Nelson, ND

Hypericum *see* **St. John's wort**

Hyperopia

Definition

Hyperopia (farsightedness) is an eye condition in which incoming rays of light reach the retina before they converge into a focused image.

Description

When light passes through the lens and cornea of the eye, its velocity decreases. The surfaces of the lens and cornea are not perpendicular to the incoming light, so the direction of the light changes. The greater the curvature of the lens system, the greater the change in the direction of the light.

When parallel light rays pass through the lens system of the eye, they are bent so they converge at a point some distance behind the lens. With perfect vision, this point of convergence where the light rays are focused is on the retina. Hyperopia is the condition in which the point of focus of parallel light rays from an object is behind the retina. This condition exists when the eyeball depth is too short for the curvature of its lens system.

There is a connection between the focusing of the lens of the eye (accommodation) and convergence of the eyes (the two eyes turning in to look at a close object). A good example is during reading, when the lens accommodates to make the close-up material clear and the eyes turn in to look at the print and keep it from doubling. Because of this connection between accommodation and convergence, if the lens needs to accommodate and focus for distance (to bring the image back onto the retina), the eyes may appear to turn in.

Causes and symptoms

Babies are generally born slightly hyperopic, but this tends to decrease with age. There is normal variation in eyeball length and curvature of the lens and cornea, and some combinations of these variables give rise to eyes in which the cornea is too flat for the distance between the cornea and the retina. If the hyperopia is not too severe, the lens may be able to accommodate and bring the image back onto the retina. This results in clear distance vision, but the constant focusing could cause headaches or eyestrain. If the lens cannot accommodate for the full extent of the hyperopia, the distant image is blurry. If the eyes are focused for distance and the person is looking at a nearby object, the lens needs to accommodate further. This may result in blurry nearby objects or headaches during close work.

Symptoms depend on the degree of hyperopia. Some individuals may have no symptoms, while others have blurry near vision and clear distance vision, and those with the most severe cases have blurry near and distance vision. Headaches and eyestrain may also occur, particularly when doing close work. An eye turned in (esotropia) may be a result of hyperopia, particularly in children. A turned eye could also signal a more serious problem, so a physician should be consulted.

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KEY TERMS

Close work—Tasks that cause the eyes to focus on something close at hand, such as reading, writing, computer work, and sewing.

Cornea—The clear, dome-shaped outer covering of the front of the eye.

Iris—The colored ring of muscle that controls the amount of light allowed to reach the retina.

Pupil—The black hole in the center of the iris through which light enters on the way to the lens and retina.

Refraction—Method of determining the optical status of the eyes. Lenses are placed before the patient's eyes while the patient reads from an eye chart.

Retina—The inner, light-sensitive layer of the eye that transforms images into electrical messages which are sent to the brain.

Diagnosis

Because it is possible to have good visual acuity with some degree of hyperopia, it is important to relax accommodation before an eye exam. This is done with the use of eye drops and is called a cycloplegic exam, or cycloplegic refraction. The patient's visual status can be determined with a hand-held instrument called a retinoscope and/or by having the patient read from an eye chart while placing different lenses in front of the patient's eyes. The patient should be driven home after such an exam because the drops cause blurred vision.

Treatment

Herbals

Bilberry (*Vaccinium myrtillus*) increases the flow of blood through the vessels of the eye. Eye drops of **eyebright** (*Euphrasia officinalis*) tea can relieve eyestrain and, taken orally with rosemary (*Rosemarinus officinalis*) in white wine, can improve vision. **Schisandra** (*Schisandra chinensis*) improves visual clarity.

Homeopathy

Rue (*Ruta graveolens*) can be prescribed for eyestrain. A homeopathic practitioner should be consulted for a proper recommendation.

Supplements

Vitamins A and C, **magnesium**, zinc, and **selenium** can help strengthen the retina and improve vision. Flavonoids—present in bilberry and eyebright—improve visual clarity.

Deconditioning

Persons whose vision changes according to their emotional state may have vision problems because of negative conditioning. Exploration and deconditioning may improve their vision.

Ayurveda

Head massage and nasya (placing drops in the nose) using warm Jivantal taila oil (which contains *Asparagus racemosus*, *Glycyrrhiza glabra*, *Leptadenia reticulata*, *Sida cordifolia*, *Sida retusa*, and **sesame oil**) may improve vision in persons who are hyperopic.

Chinese medicine

Performing qiqong eye exercises significantly reduced hyperopia in children. In another study, children with hyperopia were cured following treatment with plum-blossom needle tapping plus external application of Huoxue Zengshi Ye (Infusion for Promoting Blood Circulation and Improving Eyesight) and Huoxue Zengshi Dan (Pellets for Promoting Blood Circulation and Improving Eyesight).

Bates method

The **Bates method** involves the use of therapeutic eye exercises to help strengthen and train the eye muscles. Some patients have found the eye exercises to help, although the method has not been tested in a clinical setting.

Other

Other movement exercises or disciplines can be useful including massage, **Feldenkrais movement therapy**, **yoga** and t'ai chi. A practitioner should be consulted to determine what would be most helpful for particular individuals.

Allopathic treatment

The usual treatment for hyperopia is corrective lenses (spectacles or contact lenses). Special contact lenses (vision orthotics) that are worn overnight temporarily reshape the cornea for ideal vision on the following day.

There are now several different surgical methods used to correct hyperopia. One approach is to implant corrective contact lenses behind the patient's iris. Another approach, called laser in situ keratomileusis (LASIK), is to surgically increase the curvature of the eye's existing cornea or lens using a laser. Many surgeries are successful, but complications, including worsening of vision, may occur.

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In mid-2002, the Food and Drug Administration (FDA) approved a new surgical technique to correct hyperopia. Called conductive keratoplasty, it involves no cutting or removal of tissue. An ophthalmologist uses a small probe about the size of a human hair to pass radiofrequency waves that produce heat into the corneal tissue. They shrink the tissue and reshape the cornea.

Expected results

The prognosis for fully corrected vision is excellent for patients with low to moderate degrees of hyperopia. Patients with very high hyperopia may not achieve full correction.

Hyperopia increases the chances of chronic glaucoma, but vision loss from **glaucoma** is preventable.

Prevention

Hyperopia is usually present at birth and cannot be prevented. Eye strain may be prevented by resting the eyes when they become overworked, blinking often, and periodically changing the eyes' focus while driving or doing close work for extended periods of time.

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Hyperparathyroidism

Definition

Hyperparathyroidism is the overproduction by the parathyroid glands of a hormone called parathyroid hormone (parathormone). Parathyroid glands are four pea-sized glands located just behind the thyroid gland in the front of the neck. Parathyroid hormone (parathormone) helps regulate **calcium** and phosphorous in the body.

Description

Thyroid glands and parathyroid glands, despite their similar names and proximity, are entirely separate, and each produces hormones with different functions.

Hyperparathyroidism may be primary or secondary. It most often occurs in patients over age 30, and most commonly in patients 50 to 60 years old. It rarely occurs in children or the elderly. Women are affected by the disease up to three times more often than men. It is estimated that 28 of every 100,000 people in the United States will develop hyperparathyroidism each year.

Normally, parathyroid glands produce the parathormone as calcium levels drop and lower to meet the demands of a growing skeleton, pregnancy, or lactation. However, when one or more parathyroid glands malfunction, it can lead to overproduction of the hormone and elevated calcium level in the blood. Therefore, a common result of hyperparathyroidism is hypercalcemia, or an abnormally high level of calcium in the blood.

Primary hyperparathyroidism occurs as a malfunction of one of the glands, usually as a result of a benign tumor called an adenoma. Secondary hyperparathyroidism occurs as the result of an abnormality outside the parathyroid glands related to the body's metabolism, or chemical changes in living cells that help provide the body's energy. This causes a

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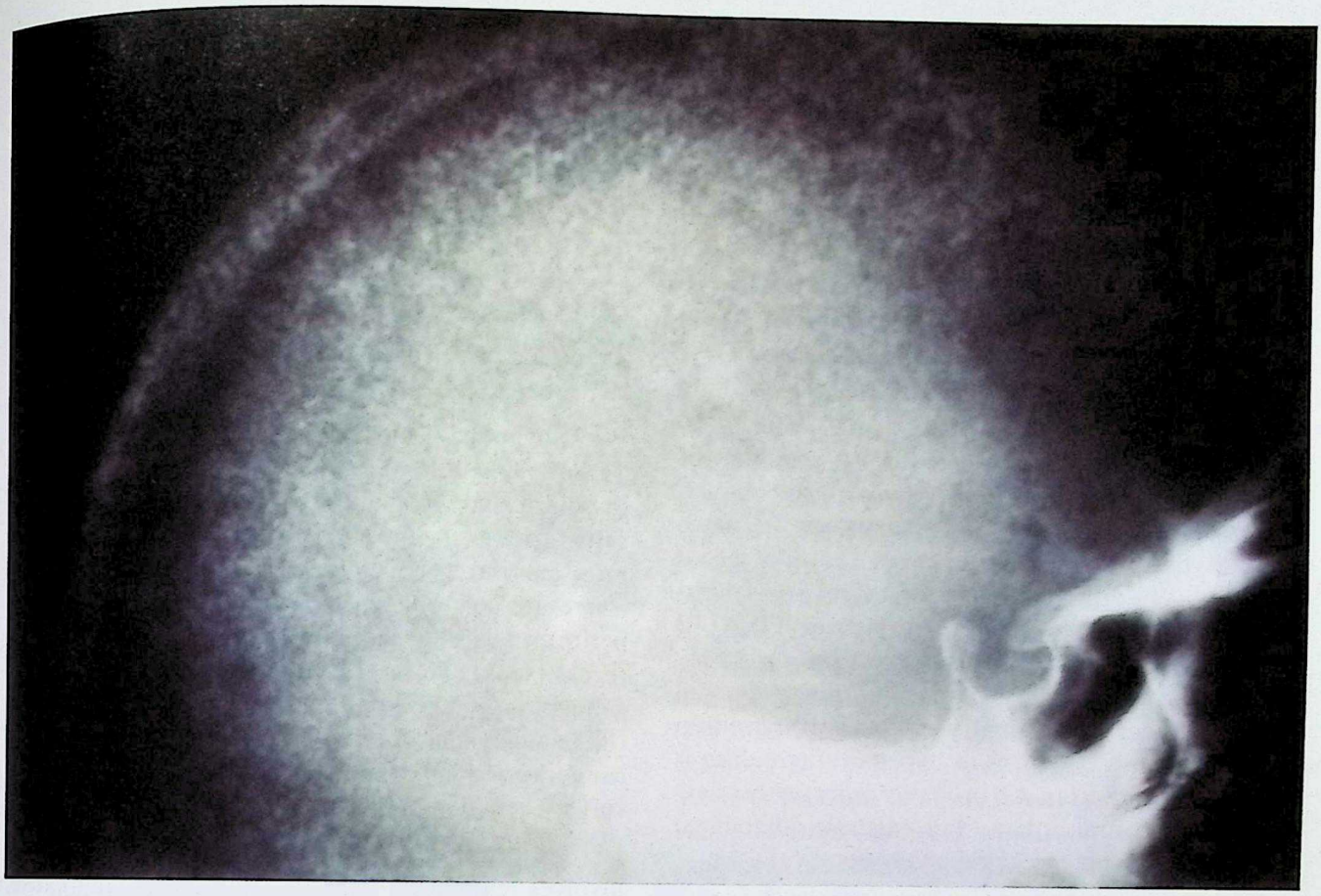

X ray of skull showing lighter areas of bone demineralization. *(Custom Medical Stock Photo. Reproduced by permission.)*

resistance to the function of the parathyroid hormones. Primary hyperparathyroidism is one of the most common endocrine disorders, led only by diabetes and **hyperthyroidism**.

Causes and symptoms

Often, there are no obvious symptoms to give rise to suspicion of hyperparathyroidism, and it is first diagnosed when a patient is discovered to be hypercalcemic during a routine blood chemistry profile. Patients may believe they have been feeling fine, but realize improvements in sleep, irritability, and memory following treatment. When symptoms are present, they may include development of gastric ulcers or **pancreatitis** because high calcium levels can cause inflammation and **pain** in the linings of the stomach and pancreas.

Most of the symptoms of hyperparathyroidism are those present as a result of hypercalcemia, such as **kidney stones**, **osteoporosis**, or bone degradation resulting from the bones giving up calcium. Muscle weakness, central nervous system disturbances such as **depression**, psychomotor and personality disturbances, and rarely, even coma, can occur. Patients also may experience heartburn, **nausea**, constipation, or abdominal pain. In secondary hyperparathyroidism, patients may show signs of calcium imbalance, such as deformities of the long bones. Symptoms of the underlying disease also may be present.

Most commonly, hyperparathyroidism occurs as the result of a single adenoma, or benign tumor, in one of the parathyroid glands. About 90 percent of all cases of hyperparathyroidism are caused by an adenoma. The tumors seldom are cancerous. They will grow to a much larger size than the parathyroid glands, often to the size of a walnut. Genetic disorders or multiple endocrine tumors also can cause a parathyroid gland to enlarge and oversecrete hormone. In 10 percent or fewer of patients with primary hyperparathyroidism, there is enlargement of all four parathyroid glands. This condition is called parathyroid hyperplasia.

Diagnosis

Diagnosis of hyperparathyroidism most often is made when a blood test (radioimmunoassay) reveals

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KEY TERMS

Demineralization—A loss or decrease of minerals in the bones.

Endocrine—Glands and hormone secretions in the body circulation.

Phosphorous—Referring to a chemical element occurring in all living cells.

high levels of parathyroid hormone and calcium. A blood test that specifically measures the amount of parathyroid hormone has made diagnosis simpler. Hypercalcemia is mild or intermittent in some patients, but persistent hypercalcemia is an excellent indicator of primary hyperparathyroidism. Dual energy x-ray absorptiometry (DEXA or DXA), a tool used to diagnose and measure osteoporosis, may be used once the diagnosis is made to show reduction in bone mass for primary hyperparathryroidism patients. Once a diagnosis of hyperparathyroidism is reached, the physician will probably order further tests to evaluate complications. For example, abdominal radiographs might reveal kidney stones.

For secondary hyperparathyroidism, normal or slightly decreased calcium levels in the blood and variable phosphorous levels may be visible. Patient history of familial kidney disease or convulsive disorders may suggest a diagnosis of secondary hyperparathyroidism. Other tests may reveal a disease or disorder that is causing the secondary hyperparathyroidism.

Treatment

Nutritional therapy

Limiting intake of soft drinks can prevent hyperparathyroidism. Soda drinks contain high levels of phosphorus. High **phosphorus** intake can cause hypocalcemia that leads to secondary hyperparathyroidism. In patients with hyperparathyroidism, forcing fluids and reducing intake of calcium-rich foods can help decrease calcium levels prior to surgery or if surgery is not necessary. These patients should not take any supplements that contain calcium without a doctor's approval.

Allopathic treatment

Hyperparathyroidism cases will usually be referred to an endocrinologist, a physician specializing in hormonal problems, or a nephrologist, who specializes in kidney and mineral disorders.

Patients with mild cases of hyperparathyroidism may not need immediate treatment if they have only slight elevations in blood calcium level and normal kidneys and bones. These patients should be regularly checked, probably as often as every six months, by physical examination and measurement of kidney function and calcium levels. A bone densitometry—a test to diagnose and monitor osteoporosis or thinning of bones—measurement should be performed every one or two years. After several years with no worsened symptoms, the length of time between exams may be increased.

Patients with more advanced hyperparathyroidism usually will have all or half of the affected parathyroid gland or glands surgically removed. This surgery is relatively safe and effective. The primary risks are those associated with general anesthesia. There are some instances when the surgery can be performed with the patient under regional, or cervical (neck) block, anesthesia. Often studies such as ultrasonography—a test with high-frequency sound waves (ultrasound) that are bounced off tissues and echoes are converted to pictures called sonograms— prior to surgery help pinpoint the affected areas.

Treatment of secondary hyperparathyroidism involves removing or treating the underlying cause. In 2004, a new drug therapy was shown to lower parathyroid levels and improve calcium and phosphorous function in patients receiving dialysis (a blood-purifying activity often performed on people with kidney diseases) who had uncontrolled secondary hyperparathyroidism. The drug, called Cinacalcet, was approved by the U.S. Food and Drug Administration for people who have chronic kidney disease with secondary hyperparathyroidism.

Expected results

Removal of the enlarged parathyroid gland or glands (parathyroidectomy) cures the disease 95 percent of the time, and relief of bone pain may occur in as few as three days. In 2004, a study showed that parathyroidectomy improved depression in patients with hyperparathyroidism. As many as 54 percent of patients who had the procedure no longer needed antidepressant medications after having the surgery. In up to five percent of patients undergoing surgery, chronically low calcium levels may result, and these patients will require calcium supplements or **vitamin D** treatment.

Damage to the kidneys as a result of hyperparathyroidism often is irreversible. Prognosis is generally good; however, complications of hyperparathyroidism such as osteoporosis, bone **fractures**, kidney stones,

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peptic ulcers, pancreatitis, and nervous system difficulties may worsen prognosis.

Prevention

Secondary hyperparathyroidism may be prevented by early treatment of the disease causing it. Early recognition and treatment of hyperparathyroidism may prevent hypercalcemia. Since the cause of primary hyperparathyroidism, the adenoma which causes parathyroid enlargement, is largely unknown, there are no prescribed prevention methods.

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Hypertension

Definition

Hypertension is high blood pressure. Blood pressure is the force of blood pushing against the walls of arteries as it flows through them. Arteries are the blood vessels that carry oxygenated blood from the heart to the body's tissues.

Description

As blood flows through arteries, it pushes against the inside of the artery walls. The more pressure the blood exerts on the artery walls, the higher the blood pressure. The size of small arteries also affects the blood pressure. When the muscular walls of arteries are relaxed, or dilated, the pressure of the blood flowing through them is lower than when the artery walls are narrow, or constricted.

Blood pressure is highest when the heart beats to pump blood out into the arteries. When the heart relaxes to fill with blood again, the pressure is at its lowest point. Blood pressure when the heart beats is called systolic pressure. Blood pressure when the heart is at rest is called diastolic pressure. When blood pressure is measured, the systolic pressure is stated first and the diastolic pressure second. Blood pressure is measured in millimeters of mercury (mm Hg). For example, if a person's systolic pressure is 120 and diastolic pressure is 80, it is written as 120/80 mm Hg. The label "mm Hg" is usually omitted when expressing blood pressure. The American Heart Association considers blood pressure above 140 over 90 as high for adults.

Hypertension is a major health problem, especially because it often has no symptoms. Many people have hypertension without knowing it. In the United States, about 50 million people age six and older have high blood pressure. Hypertension is more common in men than women and in people over the age of 65 than in younger persons. More than half of all Americans over the age of 65 have hypertension. It is also more common among African Americans than among white Americans.

Hypertension is a serious medical problem because people with the condition are at higher risk for **heart disease** and other medical problems than people with normal blood pressure. Serious complications can be avoided by getting regular blood pressure checks and treating hypertension as soon as it is diagnosed.

If left untreated, hypertension can lead to the following medical conditions:

- arteriosclerosis, also called atherosclerosis
- blindness
- heart attack
- stroke
- enlarged heart
- kidney damage

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Arteriosclerosis is hardening of the arteries. The walls of arteries have a layer of muscle and elastic tissue that make them flexible and able to dilate and constrict as blood flows through them. High blood pressure can make the artery walls thicken and harden. When artery walls thicken, the inside of the blood vessel narrows. **Cholesterol** and fats are more likely to build up on the walls of damaged arteries, making them even narrower. **Blood clots** can also get trapped in narrowed arteries, blocking the flow of blood.

Arteries narrowed by arteriosclerosis may not deliver enough blood to organs and other tissues. Reduced or blocked blood flow to the heart can cause a **heart attack**. If an artery to the brain is blocked, a **stroke** can result.

Hypertension makes the heart work harder to pump blood through the body. The extra workload can make the heart muscle thicken and stretch. When the heart becomes too enlarged it cannot pump enough blood. If hypertension is not treated, the heart may fail.

The kidneys remove the body's wastes from the blood. If hypertension thickens the arteries to the kidneys, less waste can be filtered from the blood. As the condition worsens, the kidneys fail and wastes build up in the blood. Dialysis or a kidney transplant are needed when the kidneys fail. About 25% of people who receive kidney dialysis have kidney failure caused by hypertension.

Causes and symptoms

Many different actions or situations can cause an increase in blood pressure. Physical activity can temporarily raise blood pressure. Stressful situations can make blood pressure go up. When the **stress** goes away, blood pressure usually returns to normal. These temporary increases in blood pressure are not considered hypertension. A diagnosis of hypertension is made only when a person has multiple high blood pressure readings over a period of time.

The cause of hypertension is not known in 90–95% of the people who have it. Hypertension without a known cause is called primary or essential hypertension. When a person has hypertension caused by another medical condition, it is called secondary hypertension. Secondary hypertension can be caused by a number of different illnesses. Many people with kidney disorders have secondary hypertension. The kidneys regulate the balance of salt and water in the body. If the kidneys cannot rid the body of excess salt and water, blood pressure goes up. **Kidney infections**, a narrowing of the arteries that carry blood to the kidneys, called renal artery stenosis, and other kidney disorders can disturb the salt and water balance.

Cushing's syndrome and tumors of the pituitary and adrenal glands often increase levels of the adrenal gland hormones cortisol, adrenalin, and aldosterone, which can cause hypertension. Other conditions that can cause hypertension are blood vessel diseases, thyroid gland disorders, some prescribed drugs, **alcoholism**, and **pregnancy**.

Even though the cause of most hypertension is not known, some people have risk factors that give them a greater chance of getting hypertension. Many of these risk factors can be changed to lower the chance of developing hypertension or as part of a treatment program to lower blood pressure.

Risk factors for hypertension include:

- age over 60
- male sex
- race (African Americans have a higher incidence of hypertension.)
- heredity
- salt sensitivity
- obesity
- inactive lifestyle
- heavy alcohol consumption
- use of oral contraceptives

Some risk factors for getting hypertension can be changed, whereas others cannot. Age, male sex, and race are risk factors that a person cannot alter. Some people inherit a tendency to get hypertension. People with family members who have hypertension are more likely to develop it than those whose relatives are not hypertensive. People with these risk factors can avoid or eliminate the other risk factors to lower their chance of developing hypertension.

Diagnosis

Because people with hypertension are often asymptomatic, it is important to have blood pressure checked regularly. Blood pressure is measured with an instrument called a sphygmomanometer. A cloth-covered rubber cuff is wrapped around the upper arm and inflated. When the cuff is inflated, an artery in the arm is squeezed to stop the flow of blood momentarily. Then, the air is let out of the cuff while a stethoscope placed over the artery is used to detect the sound of the blood spurting back through the artery. This first sound is the systolic pressure, the pressure when the heart beats. The last sound heard as the rest of the air

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is released is the diastolic pressure, the pressure between heart beats. Both sounds are recorded on the mercury gauge on the sphygmomanometer.

A number of factors such as **pain**, stress, or **anxiety** can cause a temporary increase in blood pressure. For this reason, hypertension is not diagnosed on the basis of one high blood pressure reading. If a blood pressure reading is 140/90 or higher for the first time, the physician will have the person return for another blood pressure check. Diagnosis of hypertension is usually made based on two or more readings after the first visit. Sometimes, patients have high blood pressure only while in the doctor's office. This phenomenon, called "white-coat hypertension" has usually been dismissed as mere anxiety over visiting the doctor. Some studies have raised questions about the dismissal of these patients as not being hypertensive, suggesting that further study is necessary to resolve the issue.

Systolic hypertension of the elderly is common and is diagnosed when the diastolic pressure is normal or low, but the systolic is elevated (e.g., 170/70 mm Hg). This condition usually co-exists with hardening of the arteries (**atherosclerosis**).

Blood pressure measurements are classified in stages, according to severity:

- normal blood pressure: less than 130/85 mm Hg
- high normal: 130–139/85–89 mm Hg
- mild hypertension: 140–159/90–99 mm Hg
- moderate hypertension: 160–179/100–109 mm Hg
- severe hypertension: 180–209/110–119
- very severe hypertension: 210/120 or higher

A typical physical examination to evaluate hypertension includes:

- medical and family history
- physical examination
- ophthalmoscopy (examination of the blood vessels in the eye)
- chest x ray
- electrocardiograph (ECG)
- blood and urine tests

Medical and family history help a physician determine if a patient has conditions or disorders that might contribute to or cause hypertension. A family history of hypertension might suggest a genetic predisposition for the disorder.

The physical examination may include several blood pressure readings at different times and in different positions. The physician uses a stethoscope to listen to sounds made by the heart and blood flowing through the arteries. The individual's pulse, reflexes, height, and weight are checked and recorded. Internal organs are palpated, or felt, to determine if they are enlarged.

Because hypertension can cause damage to the blood vessels in the eyes, the eyes may be checked with an instrument called an ophthalmoscope. The physician looks for thickening, narrowing, or hemorrhages in the blood vessels.

A chest x ray can detect an enlarged heart, other heart abnormalities, or lung disease.

An electrocardiogram (ECG) measures the electrical activity of the heart. It can detect enlargement of the heart muscle and damage to the heart muscle from blocked arteries.

Urine and blood tests may be done to evaluate health and to detect the presence of disorders that might cause hypertension.

Treatment

There is no cure for primary hypertension, but blood pressure can almost always be lowered with the correct treatment. The goal of treatment is to lower blood pressure to levels that will prevent heart disease and other complications of hypertension. In secondary hypertension, the disease that is responsible for the hypertension is treated in addition to the hypertension itself. Successful treatment of the underlying disorder may cure the secondary hypertension.

Treatment to lower blood pressure usually includes changes in diet and getting regular **exercise**. Patients with mild or moderate hypertension who do not have damage to the heart or kidneys may first be treated primarily with lifestyle changes.

Lifestyle changes that may reduce blood pressure by about 5–10 mm Hg include:

- reducing salt intake
- reducing fat intake
- losing weight
- getting regular exercise
- quitting smoking
- reducing alcohol consumption
- managing stress

Natural remedies approved by a physician may also lower or even prevent hypertension. **Aromatherapy** as a treatment option uses **essential oils** either inhaled from a bottle in times of anxiety or massaged daily into the skin at bedtime in the area beneath the collarbone. Blue **chamomile** and **lavender** are known for their stress relief and **relaxation** effects. Research

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has suggested that one of the most potent supplements for treatment of hypertension may be the amino acid **arginine** (also known as L-arginine).

Food therapy has also been shown to affect blood pressure. Muscles that regulate blood pressure have been noted to dilate with the intake of celery; celery juice has also been found to have a mild diuretic effect. Eating fresh fruits and vegetables, high in **potassium** and **magnesium**, lowers systemic **sodium** and fluid levels in the circulatory system. A 2001 study showed that reducing intake of sodium decreases blood pressure in participants with or without hypertension. **Garlic** intake has also been linked with lowering blood pressures. Taken either via enteric coated capsules or fresh garlic cloves, allicin is thought to bring down blood pressure.

Relaxation and **meditation** can help lower blood pressure. Focusing on relaxing music can also slow the heart rate and lower blood pressure, as can imagery (e.g., envisioning coolness seeping into the pores and throughout the body, sensing that blood pressure is within normal range). **Yoga** experts cite two specific poses, the corpse and the knee squeeze, when used in combination with breathing exercises, as being particularly helpful in relieving tension and improving blood flow.

Allopathic treatment

Patients whose blood pressure remains higher than 139/90 will most likely be advised to take antihypertensive medication. Numerous drugs have been developed to treat hypertension. The choice of medication depends on the stage of hypertension, side effects, other medical conditions the patient may have, and other medicines the patient is taking.

Patients with mild or moderate hypertension are initially treated with monotherapy, a single antihypertensive medicine. If treatment with a single medicine fails to lower blood pressure enough, a different medicine may be tried or another medicine may be added to the first. Patients with more severe hypertension may initially be given a combination of medicines to control their hypertension. Combining antihypertensive medicines with different types of lifestyle changes often controls blood pressure with smaller doses of each drug than would be needed for monotherapy.

Antihypertensive medicines fall into several classes of drugs:

- diuretics
- beta-blockers
- calcium channel blockers
- angiotensin converting enzyme inhibitors (ACE inhibitors)
- alpha-blockers
- alpha-beta blockers
- vasodilators
- peripheral acting adrenergic antagonists
- centrally acting agonists

Diuretics help the kidneys eliminate excess salt and water from the body's tissues and the blood, which helps reduce the swelling caused by fluid buildup in the tissues. The reduction of fluid dilates the walls of arteries and lowers blood pressure.

Beta-blockers lower blood pressure by acting on the nervous system to slow the heart rate and reduce the force of the heart's contraction. They are used with caution in patients with heart failure, **asthma**, diabetes, or circulation problems in the hands and feet.

Calcium channel blockers block the entry of calcium into muscle cells in artery walls. Muscle cells need calcium to constrict, so reducing their calcium keeps them more relaxed and lowers blood pressure.

ACE inhibitors block the production of substances that constrict blood vessels. They also help reduce the build-up of water and salt in the tissues. They are often given to patients with heart failure, kidney disease, or diabetes. ACE inhibitors may be used together with diuretics.

Alpha-blockers act on the nervous system to dilate arteries and reduce the force of the heart's contractions.

Alpha-beta blockers combine the actions of alpha and beta blockers.

Vasodilators act directly on arteries to relax their walls so blood can move more easily through them. They lower blood pressure rapidly and are injected in hypertensive emergencies when patients have dangerously high blood pressure.

Peripheral acting adrenergic antagonists act on the nervous system to relax arteries and reduce the force of the heart's contractions. They usually are prescribed together with a diuretic. Peripheral acting adrenergic antagonists can cause slowed mental function and lethargy.

Centrally acting agonists also act on the nervous system to relax arteries and slow the heart rate. They are typically used with other antihypertensive medicines.

In 2001, the U.S. Food and Drug Administration (FDA) approved the use of a medical device called RESPeRATE, developed by the health services

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KEY TERMS

Arteries—Blood vessels that carry oxygenated blood to organs and other tissues of the body.

Arteriosclerosis—Hardening and thickening of artery walls.

Cushing's syndrome—A disorder in which too much of the adrenal hormone, cortisol, is produced; caused perhaps by a pituitary or adrenal gland tumor.

Diastolic blood pressure—Blood pressure when the heart is resting between beats.

Hypertension—High blood pressure.

Renal artery stenosis—Disorder in which the arteries that supply blood to the kidneys constrict.

Sphygmomanometer—An instrument used to measure blood pressure.

Systolic blood pressure—Blood pressure when the heart contracts (beats).

Vasodilator—Any drug that relaxes blood vessel walls.

Ventricle—One of the two lower chambers of the heart.

company InterCure, that adjusts a patient's breathing patterns as a way of dealing with hypertension. By helping patients alter breathing patterns to lengthen the phase in which they exhale, the device slows breathing and produces beneficial effects on blood pressure. InterCure recommends the use of RESPeRATE in conjunction with antihypertensive medications.

Expected results

There is no cure for hypertension. However, it can be well controlled with proper treatment. The key to avoiding serious complications of hypertension is to detect and treat the disorder before damage occurs to the cardiovascular system. Because antihypertensive medicines control blood pressure but do not cure it, patients must continue taking the medications to maintain reduced blood pressure levels and avoid complications.

Prevention

Prevention of hypertension centers on avoiding or eliminating known risk factors. Even persons at risk because of age, race, or sex or those who have an inherited risk can lower their chance of developing hypertension.

The risk of developing hypertension can be reduced by making the same lifestyle changes recommended for treating hypertension.

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American Heart Association, 7272 Greenview Ave., Dallas, TX, 75231-4596, (800) AHS-USA1, http://www.amhrt.org.

National Heart, Lung, and Blood Institute, Information Center, PO Box 30105, Bethesda, MD, 20824-0105, (301) 251-1222, http://www.nhlbi.nih.gov/.

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Hyperthermia

Definition

Hyperthermia involves raising the body's core temperature as a means of eradicating tumors. The treatment simulates **fever**. Some therapies actually bring on fever through the introduction of fever-causing organisms, while others raise body temperature by directly heating the blood. The term hyperthermia also refers, in general, to any condition in which the body's temperature is significantly higher than normal.

Origins

The concept of hyperthermia dates back to investigations begun in 1883 by William B. Coley, a general surgeon at New York City's Memorial Hospital. Coley was intrigued by a paper published in 1868 by an American family physician named Peter Busch. Busch's paper described a patient with an untreatable sarcoma of the face. Though Busch had been unable to help the patient overcome her **cancer**, the patient went into remission spontaneously after suffering a bout of the skin infection erysipelas. The erysipelas resulted in a high fever ranging from 104°F to 105.8°F (40°C to 41°C). Over the next 20 years, Coley performed a series of experiments to study the effects of elevated temperature on various forms of cancer. After experimenting on animals, Coley moved to treating human cancer patients, injecting them with bacteria to induce high fevers. The bacteria he used are known as Coley's toxins. He reported much success with his method, especially against soft tissue sarcomas and sarcomas of the bone. Yet his treatment also had serious side effects due to the **infections** he introduced.

In spite of its drawbacks, Coley's work intrigued a few other researchers. A study published in *Cancer Research* in 1957 showed that in a review of 450 cases of supposed spontaneous remissions of cancer, 150 of the patients had suffered acute infections that raised their body temperatures. In the 1960s, a Cleveland surgeon and **breast cancer** specialist, George Crile Jr., published several studies of his experiments in eliminating tumors in mice using heat. Another doctor, Harry Leveen, of South Carolina, began building machines that used radio frequencies to heat either the whole body or affected parts. But Leveen's machines were not approved by the Food and Drug Administration (FDA), and Leveen took his inventory to the University of Bangor in Wales. Hyperthermia did not receive much attention in the United States after this point, but practitioners in other countries, particularly Germany, Italy, and Mexico, reported good results with it. An international congress on hyperthermia was held each year from 1977 to 2000.

Benefits

Hyperthermia has been shown in several studies to reduce malignant tumors either alone or in combination with chemotherapy. A 1998 study of patients with breast and **ovarian cancer** found that hyperthermia therapy increased the effectiveness of chemotherapy. This study suggested that patients undergoing hyperthermia might be successfully treated with lower doses of chemotherapy. A 2003 study demonstrated that women with breast cancer were less likely to experience spread of the cancer to distant lymph nodes or the lungs if they received a combination of whole-body hyperthermia and chemotherapy. A form of localized hyperthermia used to treat benign enlarged prostates can be performed in a doctor's office in as little as an hour, and this method does not have the side effects, such as **impotence** and incontinence, that often accompany traditional prostate surgery. In 2007, researchers reported at the annual meeting of the American Society of Clinical Oncology that patients with certain types of soft tissue sarcomas who had hyperthermia experienced significantly better progress with chemotherapy treatments than those who had no such ancillary treatment.

Newer methods of hyperthermia involving noninvasive (no penetration of skin) microwave technology have been introduced in other countries and made their way to the United States in early 2002. This technology offered excellent results for some cancer patients in improving five-year survival rates for some aggressive forms of cancer when combined with other cancer therapy procedures. In 2007, BSD Medical Corporation announced the development of specialized capsules used to deliver chemicals for the treatment of breast cancer through the bloodstream. The capsules not only release chemicals to tumors, but also become heated at the point of infection, increasing the efficiency of the chemicals attack on the tumor.

Description

Hyperthermia therapy involves raising the body's internal temperature, a process that can be achieved by several methods. Hyperthermia can be used to heat the whole body or an affected local region. For reducing an enlarged prostate, doctors use a device approved by the FDA in 1996 that delivers microwaves to the prostate, while water cools the surrounding tissue to prevent **burns**. For whole body hyperthermia, a method used in Europe employs a

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KEY TERMS

Sarcoma—A malignant growth in the connective tissue, bone, cartilage or muscle; usually the most lethal form of cancer.

tent-like device that delivers infrared light to the body. The patient is injected with toxins to provoke a mild fever and then monitored under lights. The lights produce a slow rise in temperature, optimally to 107.6°F (42°C). A prominent practitioner of hyperthermia in Mexico heats the patient's blood directly. Under sedation, the doctor inserts a catheter into each leg near the groin. The two catheter tubes are connected to a heat exchanger. The heat exchanger heats the patient's blood, raising the entire body temperature. The patient is monitored by thermometers in the esophagus and rectum. Body temperature is raised to 107.6°F (42°C) for about one hour.

Side effects

The side effects of hyperthermia depend on the method by which it is delivered. Cardiac problems are possible. The patient should be closely monitored during the procedure and after. For treatment of the prostate, localized hyperthermia seems to be without the side effects of traditional prostate surgery.

Research and general acceptance

Although research into hyperthermia as a cancer treatment began in the United States, many practitioners in the late 2000s were working in Europe or Mexico. Localized hyperthermia has been studied for treatment of a variety of conditions, including menorrhagia (heavy menstrual periods) and malignant tumors of the liver and rectum. As of 2008, whole body hyperthermia continued to be studied and tested for its impact on cancers.

Training and certification

Practitioners performing hyperthermia are certified medical doctors and trained assistants such as nurses and anesthesiologists.

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Hyperthyroidism

Definition

Hyperthyroidism is the overproduction of thyroid hormones by an overactive thyroid gland.

Description

Located in the front of the neck, the thyroid gland produces the hormones thyroxine (T_4) and triiodothyronine (T_3) that regulate the body's metabolic rate by regulating the production of protein and increasing oxygen absorption in every cell. In turn, the production of these hormones is controlled by thyroid-stimulating hormone (TSH) that is produced by the pituitary gland. When production of the thyroid hormones increases despite the level of TSH being produced, hyperthyroidism occurs. The excessive amount of thyroid hormones in the blood increases the body's metabolism, creating both mental and physical symptoms.

The term hyperthyroidism covers any disease that results in an overabundance of thyroid hormone. Other names for hyperthyroidism, or specific diseases within the category, include Graves' disease, diffuse toxic goiter, Basedow's disease, Parry's disease, and thyrotoxicosis. Hyperthyroidism affects 2.5 million people in the United States but could affect up to 4.5 million people because more than half of the people with thyroid

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Symptoms of hyperthyroidism

- Goiter
- Weight loss with increased appetite/food intake
- Trembling hands
- Heightened blood pressure
- Excessive nervousness, anxiety or anxiety attacks
- Increased bowel movements
- Accelerated heart rate
- Sweating
- Fatigue, muscle weakness
- Increased sensitivity to heat
- Changes in menstrual patterns

(Illustration by Corey Light. Cengage Learning, Gale)

disease do not know they have it. Although it occurs at all ages, hyperthyroidism is most likely to occur after the age of 15. There is a form of hyperthyroidism called neonatal Graves' disease, which occurs in infants born of mothers with Graves' disease. Occult hyperthyroidism may occur in patients over age 65 and is characterized by a distinct lack of typical symptoms. Diffuse toxic goiter occurs in as many as 80% of patients with hyperthyroidism.

Causes and symptoms

Hyperthyroidism is often associated with the body's production of auto-antibodies in the blood that cause the thyroid to grow and secrete excess thyroid hormone. This condition, as well as other forms of hyperthyroidism, may be inherited. Regardless of the cause, hyperthyroidism produces the same symptoms, including weight loss with increased appetite, shortness of breath and **fatigue**, intolerance to heat, heart palpitations (strong, very fast heartbeats), increased frequency of bowel movements, weak muscles, tremors, **anxiety**, and difficulty sleeping. Women also may notice decreased menstrual flow and irregular menstrual cycles.

Patients with Graves' disease often have a goiter (visible enlargement of the thyroid gland), although as many as 10% do not. These patients also may have bulging eyes. Thyroid storm, a serious form of hyperthyroidism, may show up as sudden and acute symptoms, some of which mimic typical hyperthyroidism but with the addition of **fever**, substantial weakness, extreme restlessness, confusion, emotional swings or psychosis, and perhaps even coma.

Diagnosis

Physicians look for physical signs and symptoms indicated by patient history. On inspection, the physician may note symptoms such as a goiter or eye-bulging. Other symptoms or family history may be clues to a diagnosis of hyperthyroidism. An elevated basal (lowest range of normal) body temperature above 98.6 degrees Fahrenheit (37 degrees Centigrade) may be an indication of a heightened basal metabolic rate (which measures the energy used to maintain vitality) and hyperthyroidism. A simple blood test can be performed to determine the amount of thyroid hormone in the patient's blood. The diagnosis usually is straightforward with this combination of clinical history, physical examination, and routine blood hormone tests. Radioimmunoassay, or a test to show concentrations of thyroid hormones with the use of a radioisotope (a chemical element that emits particles or energy) mixed with fluid samples, helps confirm the diagnosis. A thyroid scan is a nuclear medicine procedure involving injection of a radioisotope dye that tags the thyroid and helps produce a clear image of inflammation or involvement of the entire thyroid.

Other tests can determine thyroid function and thyroid-stimulating hormone levels. Ultrasonography (a test whereby high-frequency sound waves [ultrasound] are bounced off tissues and echoes are converted to pictures [sonograms]), computed tomography (CT) scan (an x-ray computer procedure that produces a detailed picture of a cross-section of the body), and magnetic resonance imaging (MRI; an x-ray technique that produces a detailed image of the inner body using a powerful magnet, radio waves, and a computer) may provide visual confirmation of a diagnosis or help to determine the extent of involvement.

Treatment

Alternative treatments for hyperthyroidism include nutritional therapy, herbal therapy, and **homeopathy**, the use of tiny doses of diluted and harmless remedies to catalyze healing.

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Nutritional therapy

Consumption of foods such as broccoli, brussels sprouts, cabbage, cauliflower, kale, rutabagas, spinach, turnips, peaches, and pears can help naturally suppress thyroid hormone production. Dairy products and any stimulants such as tea, coffee, soda, and other caffeinated drinks should be avoided. Under the supervision of a trained physician, high dosages of certain vitamin/mineral combinations can help alleviate hyperthyroidism.

Homeopathy

An experienced homeopath may give patients specific remedies tailored to their overall personality profile as well as their specific symptoms. Symptomatic treatments may include Iodium or Natrum muriaticum.

Other therapies

Alternative treatments that may help relieve hyperthyroidism symptoms include **traditional Chinese medicine** and Western herbal medicine. **Stress** reduction techniques such as **meditation** also may prove beneficial. Patients should contact experienced herbalists for specific preparations and treatment.

Allopathic treatment

Allopathy is the theory or system of medical practice that combats disease by use of remedies that produce effects different from those produced by the disease. Treatment depends on the specific disease and individual circumstances such as age, severity of disease, and other conditions affecting a patient's health.

Anti-thyroid drugs

Anti-thyroid drugs often are administered to help the patient's body cease overproduction of thyroid hormones. Some drugs used to interfere with the thyroid gland's uptake of **iodine** are propylthiouracil (PTU) and methimazole (Tapazole). Medication may work for young adults, pregnant women, and others. Women who are pregnant should be treated with the lowest dose required to maintain thyroid function in order to minimize the risk of **hypothyroidism** (underactive thyroid gland function) in the infant.

Radioactive iodine

Radioactive iodine is often prescribed to damage cells that make thyroid hormone. The cells need iodine to make the hormone, so they absorb any iodine found in the body. The patient may take an iodine capsule daily for several weeks, resulting in the eventual shrinkage of the thyroid in size, reduced hormone production, and a return to normal blood levels. A single large oral dose of radioactive iodine simplifies treatment but should be given only to patients who are not of reproductive age or are not planning to have children, since a large amount can concentrate in the reproductive organs (gonads).

KEY TERMS

Goiter—Chronic enlargement of the thyroid gland.

Gonads—Organs that produce sex cells—the ovaries and testes.

Metabolic—Pertaining to metabolism, or the chemical processes that take place in the body, which result in growth, energy, elimination of waste, and other body functions.

Palpitations—Rapid and forceful heartbeat.

Radioisotope—A form of a chemical element that emits radiation in the form of energy or small particles.

Thyroidectomy—Removal of the thyroid gland.

Surgery

Patients treated with thyroidectomy, in the form of partial or total removal of the thyroid, most often suffer from large goiter and have suffered relapses, even after repeated attempts to address the disease through drug therapy with iodine. Following thyroidectomy or iodine therapy, patients must be carefully monitored for years to watch for signs of hypothyroidism, or insufficient production of thyroid hormones, which can occur as a complication of thyroid production suppression.

Expected results

Hyperthyroidism generally is treatable and carries a good prognosis. Most patients lead normal lives with proper treatment. The majority of patients who receive radioactive iodine report feeling better within about three to six weeks of treatment. Thyroid storm, however, can be life-threatening and can lead to heart, liver, or kidney failure. Some patients who undergo radioactive iodine treatment or surgery become hypothyroid.

Prevention

As of 2008, there were no known prevention methods for hyperthyroidism, since its causes are

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either inherited or not completely understood. The best prevention tactic is knowledge of family history and close attention to symptoms and signs of the disease. Careful attention to prescribed therapy can prevent complications of the disease.

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Thyroid Foundation of America, One Longfellow Place, Suite 1518, Boston, MA, 02114, (800) 832-8321, http://www.tsh.org/.

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Hypnotherapy

Definition

Hypnotherapy is the treatment of a variety of health conditions by hypnotism or by inducing prolonged sleep.

Origins

Hypnotherapy is thought to date back to the healing practices of ancient Greece and Egypt. Many religions such as Judaism, Christianity, Islam, and others have attributed trance-like behavior to spiritual or divine possession.

Franz Mesmer *(Corbis-Bettmann. Reproduced by permission.)*

Austrian physician, Franz Mesmer (1734–1815), is credited with being the first person to scientifically investigate the idea of hypnotherapy, in 1779, to treat a variety of health conditions. Mesmer studied medicine at the University of Vienna and received his medical degree in 1766. Mesmer is believed to have been the first doctor to understand the relationship of psychological trauma to illness. He induced a trance-like state, which became known as mesmerism, in his patients to successfully treat nervous disorders. These techniques became the foundation for modern-day hypnotherapy.

Mesmer's original interest was in the effect of celestial bodies on human lives. He later became interested in the effects of magnetism, and found that magnets could have tremendous healing effects on the human body. Mesmer believed that the human body contained a magnetic fluid that promoted health and well being. It was thought that any blockage to the normal flow of this magnetic fluid would result in illness, and that the use of the Mesmerism technique could restore the normal flow.

Mesmer performed his technique by passing his hands up and down the patient's body. The technique was supposed to transmit magnetic fluid from his hands to the bodies of his patients. During this time period, there was no clear delineation between health conditions that were physical or psychological in

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nature. Although Mesmer did not realize it at that time, his treatments were most effective for those conditions that were primarily psychosomatic.

Mesmer's technique appeared to be quite successful in the treatment of his patients, but he was the subject of scorn and ridicule from the medical profession. Because of all the controversy surrounding mesmerism, and because Mesmer's personality was quite eccentric, a commission was convened to investigate his techniques and procedures. A very distinguished panel of investigators included Benjamin Franklin, the French chemist Antoine-Laurent Lavoisier, and physician Jacques Guillotin. The commission acknowledged that patients did seem to obtain noticeable relief from their conditions, but the whole idea was dismissed as being medical quackery.

Other pioneers in this field, such as James Braid and James Esdaile discovered that hypnosis could be used to successfully anesthetize patients for surgeries. James Braid accidentally discovered that one of his patients began to enter a hypnotic state while staring at a fixed light as he waited for his eye examination to begin. Since mesmerism had fallen out of favor, Braid coined the term hypnotism, which is derived from the Greek word for sleep. Braid also used the techniques of monotony, rhythm, and imitation to assist in inducing a hypnotic state. These techniques are generally still in use.

Around 1900, there were very few preoperative anesthetic drugs available. Patients were naturally apprehensive when facing surgery. One out of 400 patients would die, not from the surgical procedure, but from the anesthesia. Dr. Henry Munro was one of the first physicians to use hypnotherapy to alleviate patient fears about having surgery. He would get his patients into a hypnotic state and discuss their fears with them, telling them they would feel a lot better following surgery. Ether was the most common anesthetic at that time, and Dr. Munro found that he was able to perform surgery using only about 10% of the usual amount of ether.

It took more than 200 years for hypnotherapy to become incorporated into medical treatment. In 1955, the British Medical Association approved the use of hypnotherapy as a valid medical treatment, with the American Medical Association (AMA) giving its approval in 1958.

Benefits

Hypnotherapy is used in a number of fields including **psychotherapy**, surgery, dentistry, research, and medicine. Hypnotherapy is commonly used as an alternative treatment for a wide range of health conditions, including weight control, **pain** management, and **smoking** cessation. It is also used to control pain in a variety of conditions such as **headache**, facial **neuralgia**, arthritis, **burns**, musculoskeletal disorders, **childbirth**, and many more. Hypnotherapy is being used in place of anesthesia, particularly in patients who prove to be allergic to anesthetic drugs, for surgeries such as hysterectomies, cesarean sections, certain cardiovascular procedures, thyroidectomy, and others. Dentistry is using hypnotherapy with success on patients who are allergic to all types of novocaine drugs. Hypnotherapy is also useful in helping patients overcome **phobias**.

Hypnotherapy is used for nonmedical patients as well as those who wish to overcome bad habits. Hypnotherapy has been shown to help those who suffer from performance **anxiety**, such as in sports, and speaking in public. In academic applications, it has also been shown to help with learning, participating in the classroom, concentrating, studying, focusing attention span, improving memory, and helping remove mental blocks about particular subjects.

In more general areas, hypnotherapy has been found to be beneficial for problems such as motivation, procrastination, decision making, personal achievement and development, job performance, buried or repressed memories, **relaxation**, and **stress** management.

Description

Hypnotherapy involves achieving a psychological state of awareness that is different from the ordinary state of consciousness. While in a hypnotic state, a variety of phenomena can occur. These phenomena include alterations in memory, heightened susceptibility to suggestion, paralysis, sweating, and blushing. All of these changes can be produced or removed in the hypnotic state. Many studies have shown that roughly 90% of the population is capable of being hypnotized.

This state of awareness can be achieved by relaxing the body, focusing on breathing, and shifting attention away from the external environment. In this state, the patient has a heightened receptivity to suggestion. The usual procedure for inducing a hypnotic trance in another person is by direct command repeated in a soothing, monotonous tone of voice.

Preparations

Ideally, the following conditions should be present to successfully achieve a state of hypnosis:

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- willingness to be hypnotized
- rapport between the patient or client and the hypnotherapist
- a comfortable environment that is conducive to relaxation

Precautions

Hypnotherapy can have negative outcomes. When used as entertainment, people have been hypnotized to say or do things that would normally embarrass them. There have been instances where people already dangerously close to psychological breakdown have been pushed into an emotional crisis during what was supposed to be a harmless demonstration of hypnosis. A statement from the World Hypnosis Organization (WHO) warns against performing hypnosis on patients suffering from psychosis, organic psychiatric conditions, or antisocial personality disorders. Because there are no standard licensing requirements, in the wrong hands, there is a risk that the hypnotist will have difficulty in controlling or ending a hypnotic state that has been induced in the patient.

There is a commonly held belief that a person cannot be coerced into doing things that he or she would not normally do while under hypnosis. The hynotherapist should take care however, not to give suggestions during hypnosis that are contrary to the patient's moral code.

Many religions do not condone the practice of hypnotherapy. Leaders of the Jehovah's Witnesses and Christian Science religions oppose the use of hypnotherapy and advise their members to avoid it completely, whether for entertainment or therapy. The Church of Jesus Christ of Latter-Day Saints approves it for medical purposes, but cautions members against allowing themselves to be hypnotized for entertainment or demonstration purposes.

In 1985, The AMA convened a commission that warned against using hypnotherapy to aid in recollection of events. The commission cited studies that showed the possibility of hypnotic recall resulting in confabulation or an artificial sense of certainty about the course of events. As a result, many states limit or prohibit testimony of hypnotized witnesses or victims.

Side effects

Experiments have been conducted to determine any side effects of hypnotherapy. Some subjects have reported side effects such as headache, stiff neck, drowsiness, cognitive distortion or confusion, **dizziness**, and anxiety. However, most of these effects cleared up within several hours of the hypnotherapy session.

Research and general acceptance

Research on the effectiveness of hypnotherapy on a variety of medical conditions is extensive. In one study, the use of hypnotherapy did not seem to alter the core symptoms in the treatment of **attention-deficit hyperactivity disorder** (ADHD); however, it did seem useful in managing the associated symptoms including sleep disturbances and tics.

Hypnotherapy is being studied in children who have common, chronic problems and to aid in relieving pain. Children are particularly good candidates for hypnotherapy because their lack of worldly experience enables them to move easily between the rational world and their imagination. Studies with children have shown responses to hypnotherapy ranging from diminished pain and anxiety during a number of medical procedures, a 50% range in reduction of symptoms or a complete resolution of a medical condition, and a reduction in use of anti-nausea medication and **vomiting** during chemotherapy for childhood cancers.

In 2002, a report compiled several study results on hypnosis. One recent study evaluated how self&hypnosis relieved pain and anxiety in patients undergoing angioplasty with local anesthesia. Those patients needed less sedation and less procedure time. Another study found that pregnant adolescents counseled in hypnosis needed less anesthesia during delivery and less pain medication afterward. They also left the hospital sooner.

The use of hypnotherapy with **cancer** patients is another area being investigated. A meta-analysis of 116 studies showed positive results of using hypnotherapy with cancer patients. Ninety-two percent showed a positive effect on **depression**; 93% showed a positive effect on physical well-being; 81% showed a positive effect on vomiting; and 92% showed a positive effect on pain. In 2002, the National Hospice and Palliative Care Association reported that it recognizes hypnosis therapy as one effective tool to help terminally ill patients deal with their fears, feelings, emotions, and promote relaxation.

Training and certification

As of 2000, anyone could be a hypnotherapist. It is very easy to learn how to hypnotize someone, and the fact that hypnotism dates back to ancient times proves the ease with which a trance can be induced. There are no licensing procedures in place that limit the practice of hypnotherapy to medical professionals. Hypnotherapists are not regulated in any way; there are no uniform education or certification requirements to perform hypnotherapy.

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The National Board for Hypnotherapy and Hypnotic Anaesthesiology (NBHA) has specific membership requirements, and also offers varying levels of professional recognition. Certification as a Clinical Hypnotherapist (C.Ht.) requires a minimum of 200 hours of classroom instruction, independent study and life learning experience in the medical, dental, psychological, or peer counseling professions. Certification as a Medical Hypnotherapist (C.M.H.) requires meeting the standards for the Clinical Hypnotherapist level plus attending a residential training course or home study training course that requires a clinical practicum/internship approved by the NBHA. Certification as a Hypno-Anesthesia Therapist (Ct.H.A.) requires the successful completion of an NBHA-approved course in Visualization and **Guided Imagery** for Pain Management, and a passing score on the examination. Certification as a Registered Hypnotic Anaesthesiologist (R.H.A.) requires two years of continuous membership in the NBHA at the Ct.H.A. level, and completion of advanced training seminars. The highest level of certification that can be obtained in this organization is Fellow (F.B.H.A.). Requirements for achieving this level of certification include membership at the R.H.A. level and a graduate degree from an accredited university, plus submitting a comprehensive thesis paper.

There is an ongoing debate regarding the issue of clinically trained versus lay hypnotists. The position of the American Society of Clinical Hypnotists (ASCH) is that the training of lay hypnotists is unethical. This organization supports only the training of those persons who are pursuing an advanced degree in the health sciences. ASCH further believes that hypnotherapy is a treatment modality to be used in conjunction with other forms of treatment, not a treatment that stands alone. Medical professionals believe that lay hypnotists keep the view of hypnotherapy in low esteem by the general public. They also believe that their practices are impacted economically by the lay hypnotists.

ASCH and the Society for Clinical and Experimental Hypnosis (SCEH) are two organizations that are trying to set up formal screening, training, and accrediting standards. Both of these organizations offer formal training to medical professionals at their annual meetings.

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American Board of Hypnotherapy. 16842 Von Karman Avenue, Suite 476, Irvine, CA 92714. http://www.hypnosis.com/.

American Psychotherapy & Medical Hypnosis Association. 210 S. Sierra, Reno, NV 89501. http://members.xoom.com/Hypnosis/.

American Society of Clinical Hypnosis. 200 E. Devon Avenue, Des Plaines, IL 60018.

International Council for Medical and Clinical Therapists. 7361 McWhorter Place, Suite 300, Annandale, VA 22003-5469. http://www.ultradepth.com/ICMCT.htm.

International Medical and Dental Hypnotherapy Association. 4110 Edgeland, Suite 800, Royal Oak, MI 48073-2285. http://www.infinityinst.com.

The National Board for Hypnotherapy and Hypnotic Anaesthesiology. 7841 West Ludlow Drive, Suite A, Peoria, AZ 85381. http://www.nbha-medicine.com/index.html.

National Guild of Hypnotists. PO Box 308, Merrimack, NH. http://www.ngh.net

Society for Clinical and Experimental Hypnosis. 6728 Old McLean Village Drive, McLean, VA 22101.

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World Hypnosis Organization, Inc. 2521 W. Montrose Avenue, Chicago, IL 60618. http://www.worldhypnosis.org/about.html.

Kim Sharp
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Hypoglycemia

Definition

Hypoglycemia is a condition in which one's blood sugar falls to abnormally low levels.

Description

Carbohydrates are the main dietary source of the glucose that is absorbed into the bloodstream and used to fuel the body's cells and organs. Glucose concentration is controlled by hormones, primarily insulin and glucagon. Glucose concentration is also controlled by epinephrine (adrenalin) and norepinephrine, as well as growth hormone. If these regulators are not working properly, levels of blood sugar can become either excessive (as in hyperglycemia) or inadequate (as in hypoglycemia). If individuals have a blood sugar level of 70 mg/dL or less, they are considered hypoglycemic, although glucose levels vary widely from one person to another.

Hypoglycemia can occur in several ways.

Drug-induced hypoglycemia

Drug-induced hypoglycemia, a complication of diabetes, is the most commonly seen and most dangerous form of hypoglycemia.

Hypoglycemia occurs most often in diabetics who must inject insulin periodically to lower their blood sugar. While other diabetics are also vulnerable to low blood sugar episodes, they have a lower risk of a serious outcome than do insulin-dependent diabetics. Unless recognized and treated immediately, severe hypoglycemia in the insulin-dependent diabetic can lead to generalized convulsions followed by amnesia and unconsciousness. Death, though rare, is a possible outcome.

In insulin-dependent diabetics, hypoglycemia known as an insulin reaction or insulin shock can be caused by several factors. These include overmedicating with manufactured insulin, missing or delaying a meal, eating too little food for the amount of insulin taken, exercising too strenuously, drinking too much alcohol, or any combination of these factors.

Reactive hypoglycemia

Reactive hypoglycemia (also called idiopathic postprandial hypoglycemia) occurs two to four hours after consumption of a high-carbohydrate meal. A number of kinds of reactive hypoglycemia have been identified. They occur as the result of a deficiency of certain essential hormones or enzymes or problems with the digestive system, especially as the result of stomach surgery. In some cases, this form of hypoglycemia appears to be associated with malfunctions or diseases of the liver, pituitary, adrenals, liver, or pancreas. Children intolerant of a natural sugar (fructose) or who have inherited defects that affect digestion may also experience hypoglycemic attacks. Some children with a negative reaction to aspirin also experience reactive hypoglycemia. It sometimes occurs among people with an intolerance to the sugar found in milk (galactose), and it also often begins before the onset of diabetes.

Fasting hypoglycemia

Fasting hypoglycemia sometimes occurs after long periods without food, but it also happens occasionally following strenuous **exercise**, such as running in a marathon.

Other factors sometimes associated with hypoglycemia are:

- pregnancy
- a weakened immune system
- a poor diet high in simple carbohydrates
- prolonged use of drugs, including antibiotics
- chronic physical or mental stress
- heartbeat irregularities (arrhythmias)
- allergies
- breast cancer
- high blood pressure treated with beta-blocker medications (after strenuous exercise)
- upper gastrointestinal tract surgery

Causes and symptoms

When carbohydrates are eaten, they are converted to glucose that goes into the bloodstream and is distributed throughout the body. Simultaneously, a combination of chemicals that regulate how the body's cells absorb that sugar is released from the liver, pancreas, and adrenal glands. These chemical regulators include insulin, glucagon, epinephrine (adrenalin),

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and norepinephrine. The mixture of these regulators released following digestion of carbohydrates is never the same, since the amount of carbohydrates that are eaten is never the same.

Interactions among the regulators are complicated. Any abnormalities in the effectiveness of any one of the regulators can reduce or increase the body's absorption of glucose. Gastrointestinal enzymes such as amylase and lactase that break down carbohydrates may not be functioning properly. These abnormalities may produce hyperglycemia or hypoglycemia and can be detected when the level of glucose in the blood is measured.

Cell sensitivity to these regulators can be changed in many ways. Over time, a person's **stress** level, exercise patterns, advancing age, and dietary habits influence cellular sensitivity. For example, a diet consistently overly rich in carbohydrates increases insulin requirements over time. Eventually, cells can become less receptive to the effects of the regulating chemicals, which can lead to glucose intolerance.

Diet is both a major factor in producing hypoglycemia as well as the primary method for controlling it. **Diets** typical of western cultures contain excess refined carbohydrates, especially in the form of simple carbohydrates such as sweeteners, which are more easily converted to sugar. In poorer parts of the world, the typical diet contains even higher levels of carbohydrates. Fewer dairy products and meat are eaten, and grains, vegetables, and fruits are consumed. This dietary trend is balanced, however, since people in these cultures eat more complex carbohydrates, eat smaller meals, and usually use carbohydrates more efficiently through physical labor.

Early symptoms of severe hypoglycemia, particularly in the drug-induced type of hypoglycemia, resemble an extreme shock reaction. Symptoms include:

- cold and pale skin
- numbness around the mouth
- apprehension
- heart palpitations
- emotional outbursts
- hand tremors
- mental cloudiness
- dilated pupils
- sweating
- fainting

Mild attacks, however, are more common in reactive hypoglycemia and are characterized by extreme tiredness. Patients first lose their alertness, then their muscle strength and coordination. Thinking grows fuzzy, and finally patients become so tired that they become "zombie-like," awake but not functioning. Sometimes they actually fall asleep. Unplanned naps are typical of the chronic hypoglycemic patient, particularly following meals.

Additional symptoms of reactive hypoglycemia include headaches, double vision, staggering or an inability to walk, a craving for salt and/or sweets, abdominal distress, premenstrual tension, chronic **colitis**, **allergies**, ringing in the ears, unusual patterns in the frequency of urination, skin eruptions and inflammations, **pain** in the neck and shoulder muscles, memory problems, and sudden and excessive sweating.

Unfortunately, a number of these symptoms mimic those of other conditions. For example, the **depression**, **insomnia**, irritability, lack of concentration, crying spells, **phobias**, forgetfulness, confusion, unsocial behavior, and suicidal tendencies commonly seen in nervous system and psychiatric disorders may also be hypoglycemic symptoms. It is very important that anyone with symptoms that may suggest reactive hypoglycemia see a doctor.

Because all of its possible symptoms are not likely to be seen in any one person at a specific time, diagnosing hypoglycemia can be difficult. One or more of its many symptoms may be due to another illness. Symptoms may persist in a variety of forms for long periods of time. Symptoms can also change over time within the same person. Factors that can influence symptoms include physical or mental activities, physical or mental state, the amount of time passed since the last meal, the amount and quality of sleep, and exercise patterns.

Diagnosis

Drug-induced hypoglycemia

Once diabetes is diagnosed, patients then monitor their blood sugar level with a portable machine called a glucometer. The diabetic places a small blood sample on a test strip that the machine can read. If the test reveals that the blood sugar level is too low, the diabetic can make a correction by eating or drinking additional carbohydrates.

Reactive hypoglycemia

Reactive hypoglycemia can be diagnosed only by a doctor. Symptoms usually improve after the patient has gone on an appropriate diet. Reactive hypoglycemia was diagnosed more frequently in the 1980s and 1990s than it is in the late 2000s. Studies have shown

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that most people suffering from its symptoms test normal for blood sugar, leading many doctors to suggest that actual cases of reactive hypoglycemia are quite rare. Some doctors think that people with hypoglycemic symptoms may be particularly sensitive to the body's normal postmeal release of the hormone epinephrine or are actually suffering from some other physical or mental problem. Other doctors believe reactive hypoglycemia is actually the early onset of diabetes that occurs after a number of years. In the late 2000s there continues to be disagreement about the cause or causes of reactive hypoglycemia.

A common test to diagnose hypoglycemia is the extended oral glucose tolerance test. Following an overnight fast, a concentrated solution of glucose is drunk and blood samples are taken hourly for five to six hours. Though this test remains helpful in early identification of diabetes, its use in diagnosing chronic reactive hypoglycemia has lost favor because it can trigger hypoglycemic symptoms in people with otherwise normal glucose readings. As of 2008 some doctors recommend that blood sugar be tested at the actual time a person experiences hypoglycemic symptoms.

Treatment

Treatment of the immediate symptoms of hypoglycemia can include eating sugar. For example, a patient can eat a piece of candy, drink milk, or drink fruit juice. Glucose tablets can be used by patients, especially those who are diabetic. Effective treatment of hypoglycemia over time requires the patient to follow a modified diet. Patients are usually encouraged to eat small, but frequent, meals throughout the day, avoiding excess simple sugars (including alcohol), fats, and fruit drinks.

One of the herbal remedies commonly suggested for hypoglycemia is a decoction (an extract made by boiling) of gentian (*Gentiana lutea*). It should be drunk warm 15–30 minutes before a meal. Gentian is believed to help stimulate the endocrine (hormone-producing) glands.

In addition to the dietary modifications recommended above, people with hypoglycemia may benefit from supplementing their diet with **chromium**, which is believed to help improve blood sugar levels. Chromium is found in whole grain breads and cereals, cheese, molasses, lean meats, and **brewer's yeast**. Eating oats can help stabilize blood sugar levels. Daily supplements of **vitamin E** are also recommended. Hypoglycemics should avoid alcohol, **caffeine**, and cigarette smoke, since these substances can cause significant swings in blood sugar levels.

Allopathic treatment

Those patients with severe hypoglycemia may require fast-acting glucagon injections that can stabilize their blood sugar within approximately 15 minutes.

Prevention

Drug-induced hypoglycemia

Preventing hypoglycemic insulin reactions in diabetics requires taking glucose readings through frequent blood sampling. Insulin can then be regulated based on those readings. Maintaining proper diet is also a factor. Programmable insulin pumps implanted under the skin have proven useful in reducing the incidence of hypoglycemic episodes for insulin-dependent diabetics. Drug manufacturers have also developed a number of insulin analogs, forms of insulin produced by recombinant DNA (genetic engineering) technology that can be used in place of natural insulin. Some examples of these analogs are lispro (Humalog), aspart (NovoLog), insulin glulisine (Apidra), insulin glargine (Lantus), and insulin detemir (Levemir).

Reactive hypoglycemia

The onset of reactive hypoglycemia can be avoided or at least delayed by following the same kind of diet used to control it. While not as restrictive as the diet diabetics must follow to keep tight control over their disease, it is quite similar.

There are a variety of diet recommendations for the reactive hypoglycemic. Patients should:

- Avoid overeating.
- Never skip breakfast.
- Include protein in all meals and snacks, preferably from sources low in fat, such as the white meat of chicken or turkey, most fish, soy products, or skim milk.
- Restrict intake of fats (particularly saturated fats, such as animal fats), and avoid refined sugars and processed foods.
- Keep a "food diary." Until the diet is stabilized, patients should note what and how much they eat and drink at every meal. If symptoms appear following a meal or snack, patients should note them and look for patterns.

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KEY TERMS

Adrenal glands—Two organs that sit atop the kidneys, which make and release hormones such as epinephrine.

Epinephrine—Also called adrenalin, a secretion of the adrenal glands (along with norepinephrine) that helps the liver release glucose and limits the release of insulin. Norepinephrine is both a hormone and a neurotransmitter, a substance that transmits nerve signals.

Fructose—A type of natural sugar found in many fruits, vegetables, and in honey.

Glucagon—A hormone produced in the pancreas that raises the level of glucose in the blood. An injectable form of glucagon, which can be bought in a drug store, is sometimes used to treat insulin shock.

Postprandial—After eating or after a meal.

- Eat fresh fruits, but restrict the amount eaten at one time. Patients should remember to eat a source of protein whenever they eat high sources of carbohydrate such as fruit. Apples make particularly good snacks because, of all fruits, the carbohydrate in apples is digested most slowly.
- Follow a diet that is high in fiber. Fruit is a good source of fiber, as is oatmeal and oat bran, which slows the buildup of sugar in the blood during digestion.

A doctor can recommend a proper diet, and there are many cookbooks available for diabetics. Recipes found in such books are equally effective in helping to control hypoglycemia.

Expected results

Like diabetes, there is no cure for reactive hypoglycemia, only ways to control it. While some chronic cases continue through life (rarely is there complete remission of the condition), others develop into type II (age onset) diabetes. Hypoglycemia appears to have a higher-than-average incidence in families in which there has been a history of hypoglycemia or diabetes among their members, but whether hypoglycemia is a controllable warning of oncoming diabetes had not been determined by clinical research as of 2008.

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ORGANIZATIONS

Hypoglycemia Support Foundation, PO Box 451778, Sunrise, FL, 33345, http://www.hypoglycemia.org/.

National Institute of Diabetes and Digestive and Kidney Diseases, Office of Communications and Public Liaison, Building 31, Room 9A06, 31 Center Dr., MSC 2560, Bethesda, MD, 20892-2560, (301) 496-3583, http://www2.niddk.nih.gov/.

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Hypothyroidism

Definition

Hypothyroidism occurs when there are abnormally low amounts of thyroid hormones in the bloodstream. The condition develops when the thyroid gland fails to produce or secrete as much thyroxine (T_4) and/or triiodothyronine (T_3) as the body needs. Because T_3 and T_4 regulate such essential functions as heart rate, digestion, physical growth, and mental development, an insufficiency of these hormones can slow life-sustaining processes, damage organs and tissues in every part of the body, and lead to life-threatening complications.

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Symptoms of hypothyroidism

- Goiter
- Unexplained weight gain
- Tingling or numbness in the hands
- Heightened sensitivity to cold
- Lethargy
- Decreased heart rate
- Hoarse voice
- Pain, stiffness or swelling in your joints
- Elevated blood cholesterol level
- Muscle ache, weakness, or stiffness
- Heavier than normal menstrual periods

(Illustration by Corey Light. Cengage Learning, Gale)

Description

Hypothyroidism is one of the most common chronic diseases in the United States. Symptoms may not appear until years after the thyroid has stopped functioning, and they are often mistaken for signs of other illnesses, **menopause**, or **aging**. Although this condition is believed to affect as many as 11 million adults and children, as many as two of every three people with hypothyroidism may not know they have the disease.

The thyroid gland influences almost every organ, tissue, and cell in the body. It is shaped like a butterfly and located just below the Adam's apple. The thyroid stores **iodine** the body gets from food and uses this mineral to synthesize T_4 and T_3. T_3 is also produced outside the thyroid gland by the deiodination (removal of iodine) from T_4. This process actually accounts for more than half of the T_3 that circulates in the bloodstream. Low thyroid hormone levels can alter weight, appetite, sleep patterns, body temperature, sex drive, and a variety of other physical, mental, and emotional characteristics.

Scientists know of three types of hypothyroidism. The most common is primary hypothyroidism, in which the thyroid does not produce an adequate amount of T_4. Secondary hypothyroidism develops when the pituitary gland does not release enough of the thyroid-stimulating hormone (TSH) that prompts the thyroid to manufacture T_4. Tertiary hypothyroidism results from a malfunction of the hypothalamus, the part of the brain that controls the endocrine system. Drug-induced hypothyroidism, an adverse reaction to medication, occurs in two of every 10,000 people, but rarely causes severe hypothyroidism.

Hypothyroidism is at least twice as common in women as it is in men. Although hypothyroidism is most common in women who are middle-aged or older, the disease can occur at any age. Newborn infants are tested for congenital (acquired in uterus) thyroid deficiency (cretinism) using a test that measures the levels of thyroxine and TSH in the infant's blood. Treatment within the first few months of life can prevent mental retardation and physical abnormalities. Older children who develop hypothyroidism suddenly stop growing.

Factors that increase a person's risk of developing hypothyroidism include age, weight, and medical history. Women are more likely to develop the disease after age 50; men, after age 60. **Obesity** (excessively fat condition) also increases the risk. A family history of thyroid problems or a personal history of high **cholesterol** levels or such autoimmune diseases as lupus, **rheumatoid arthritis**, or diabetes can make an individual more susceptible to hypothyroidism.

Causes and symptoms

Hypothyroidism is most often the result of Hashimoto's disease, also known as chronic thyroiditis (inflammation of the thyroid gland). In this disease, the immune system fails to recognize that the thyroid gland is part of the body's own tissue and attacks it as if it were a foreign body. The attack by the immune system impairs thyroid function and sometimes destroys the gland. Other causes of hypothyroidism include:

- Radiation (the process whereby an element such as radium emits rays). Radioactive (the quality some atoms have of producing energy) iodine used to treat hyperthyroidism (overactive thyroid) or radiation treatments for head or neck cancers can destroy the thyroid gland
- Surgery. Removal of the thyroid gland because of cancer or other thyroid disorders can result in hypothyroidism
- Viruses (very small organisms that cause disease) and bacteria (one-cell organisms that divide and can cause disease). Infections that depress thyroid hormone production usually cause permanent hypothyroidism.

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- Human immunodeficiency virus (HIV). Among viruses, HIV, the virus that causes acquired immunodeficiency syndrome (AIDS), may cause overt hypothyroidism.
- Medication. Nitroprusside, lithium, or iodides can induce hypothyroidism. Because patients who use these medications are closely monitored by their doctors, this side effect is very rare.
- Pituitary gland malfunction. In this rare condition the pituitary gland fails to produce enough TSH to activate the thyroid's production of T_4.
- Congenital defect. One of every 4,000 babies is born without a properly functioning thyroid gland.
- Diet. Because the thyroid makes T_4 from iodine contained in food, an iodine-deficient diet can cause hypothyroidism. Adding iodine to table salt and other common foods has all but eliminated iodine deficiency in the United States. Certain foods (cabbage, rutabagas, peanuts, peaches, soybeans, spinach) can interfere with thyroid hormone production.
- Environmental contaminants. Certain industrial chemicals, such as PCBs, found in the local environment at high levels also may cause hypothyroidism.

Hypothyroidism sometimes is referred to as a silent disease because early symptoms may be so mild that no one realizes anything is wrong. Untreated symptoms become more noticeable and severe and can lead to confusion and mental disorders, breathing difficulties, heart problems, fluctuations in body temperature, and death.

Someone who has hypothyroidism will probably have more than one of the following symptoms:

- fatigue
- decreased heart rate
- progressive hearing loss
- weight gain
- problems with memory and concentration
- depression
- goiter (enlarged thyroid gland)
- muscle pain or weakness
- loss of interest in sex; decreased libido
- numb, tingling hands
- dry skin
- swollen eyelids
- dryness, loss, or premature graying of hair
- extreme sensitivity to cold
- constipation
- irregular menstrual periods
- hoarse voice

Hypothyroidism usually develops gradually. When the disease results from surgery or other treatment for **hyperthyroidism**, symptoms may appear suddenly and include severe **muscle cramps** in the arms, legs, neck, shoulders, and back. It is important to see a doctor if any of these symptoms appear unexpectedly. When hypothyroidism remains undiagnosed and untreated, a person may eventually develop myxedema. Symptoms of this rare but potentially deadly complication include enlarged tongue, swollen facial features, hoarseness, and physical and mental sluggishness.

Myxedema coma can cause unresponsiveness, irregular and shallow breathing, and a drop in blood pressure and body temperature. The onset of this medical emergency can be sudden in people who are elderly or have been ill, injured, or exposed to very cold temperatures; who have recently had surgery; or who use sedatives or antidepressants. Without immediate medical attention, myxedema coma can be fatal.

Diagnosis

The diagnosis of hypothyroidism is based on the patient's observations, medical history, physical examination, and thyroid function tests. Doctors who specialize in treating thyroid disorders (endocrinologists) are most apt to recognize subtle symptoms and physical indications of hypothyroidism. A blood test known as a thyroid-stimulating hormone (TSH) assay tests of T_4 and T_3 levels; a thyroid nuclear medicine scan and thyroid ultrasound are used to confirm the diagnosis. A woman being tested for hypothyroidism should let her doctor know if she is pregnant or breastfeeding. All patients should be sure their doctors are aware of any recent procedures involving radioactive materials or contrast media.

The TSH assay is extremely accurate, but some doctors doubt the test's ability to detect mild hypothyroidism. They advise patients to monitor their basal (resting) body temperature for below-normal readings that could indicate the presence of hypothyroidism. These readings should be taken for five consecutive days, starting on the second day of the menstrual cycle for female patients.

Treatment

Alternative treatments are aimed primarily at strengthening the thyroid gland and will not eliminate the need for thyroid hormone medications. They include nutritional therapy, herbal therapy, and **exercise**.

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Nutritional therapy

If a person is experiencing symptoms resembling those of hypothyroidism, it is best to talk to a family physician immediately for appropriate diagnosis and treatments. Nutritional therapy should only be complementary and not be used to replace conventional treatment for this disorder. In 2004, a study found that feeding soy formula to infants with congenital hypothyroidism led to prolonged increases in TSH levels. The study authors recommended close follow-up and frequent TSH measures if infants are put on soy-based formulas.

A naturopath or a nutritionist may recommend the following dietary changes to improve mild hypothyroidism:

- Avoiding eating the following raw foods: cabbage, mustard, spinach, cassava roots, peanuts, soybeans, and peaches. They may interfere with thyroid hormone production if not cooked.
- Eating foods with high iodine content such as fish, shellfish, and seaweed.
- Taking multivitamin and mineral supplements daily. Vitamins A, B_2, B_3, B_6, E, and zinc are needed for normal thyroid hormone production.
- Strengthening thyroid function with thyroid preparations sold at local food stores. They are used to treat mild hypothyroidism only. Available products include thyroid extracts, iodine, zinc, or tyrosine. Most Americans may not need iodine supplements as the daily requirement can easily be met by eating iodine-rich foods or using iodized salt. Consuming more than 600 mcg of iodine per day may result in harmful or toxic effects

Herbal therapies

Herbal remedies to improve thyroid function and relieve thyroid symptoms include **Siberian ginseng** (for treatment of **fatigue**), *Panax ginseng*, and **bladderwrack** (*Fucus vesiculosus*,) which can be taken in capsule form or as a tea.

Homeopathic remedies

Homeopathic treatments (tiny doses of diluted, safe remedies to promote healing) may gradually reduce the need for supplemental thyroid hormone in some patients. Homeopathic remedies for hypothyroidism include homeopathic thyroid as well as others based on the patient's individualized symptoms.

Exercise

Exercise improves thyroid function by stimulating more production of thyroid hormone and making body tissues more responsive to the effects of thyroid hormone. It also increases the metabolic (chemical changes in cells providing energy to the body) rate and helps hypothyroid patients lose weight.

KEY TERMS

Cretinism—Severe hypothyroidism that is present at birth.

Endocrine system—The network of glands that produces hormones and releases them into the bloodstream. The thyroid gland is part of the endocrine system.

Hypothalamus—The part of the brain that controls the endocrine system.

Myxedema—A condition that can result from a thyroid gland that produces too little of its hormone. In addition to a decreased metabolic rate, symptoms may include anemia, slow speech, an enlarged tongue, puffiness of the face and hands, hair loss, coarse and thickened skin, and sensitivity to cold.

Pituitary gland—A small oval endocrine gland attached to the hypothalamus. The pituitary gland releases TSH, the hormone that activates the thyroid gland.

Thyroid-stimulating hormone (TSH)—A hormone secreted by the pituitary gland that controls the release of T_4 by the thyroid gland.

Thyroxine (T_4)—A thyroid hormone that regulates many essential body processes.

Triiodothyronine (T_3)—A thyroid hormone similar to thyroxine but more powerful. Preparations of triiodothyronine are used in treating hypothyroidism.

Allopathic treatment

In allopathic treatment—medical practice that combats disease with remedies that produce effects different from those produced by the disease—natural or synthetic thyroid hormones are used to restore normal (euthyroid) thyroid hormone levels. Synthroid, or synthetic T_4, is easy to take and works for about 80% of patients. In addition, some patients need additional T_3. However, physicians typically disagree about adding this therapy. Synthetic hormones are at least as effective as natural substances, but it may take several months to determine the correct dosage. Patients start to feel better within 48 hours, but symptoms return if they stop taking the medication.

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Many doctors prescribe levothyroxine **sodium** tablets, and many people with hypothyroidism take the medication for the rest of their lives. Aging, other medications, and changes in weight and general health can affect how much replacement hormone a patient needs, and regular TSH tests are used to monitor hormone levels. Patients should not switch from one brand of thyroid hormone to another without a doctor's permission.

Possible side effects of too much T_4 or T_3 include **osteoporosis** (after long-term use), occasional **anxiety**, heart palpitations (very fast, strong heartbeat), **insomnia**, and occasional episodes of mania (acting crazed).

Regular exercise and a **high-fiber diet** can help maintain thyroid function and prevent **constipation**.

Expected results

Thyroid hormone replacement therapy generally maintains normal thyroid hormone levels unless treatment is interrupted or discontinued.

Prevention

Primary hypothyroidism cannot be prevented, but routine screening of adults can detect the disease in its early stages and prevent complications.

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ORGANIZATIONS

American Thyroid Association, 6066 Leesburg Pike, Suite 550, Falls Church, VA, 22041, (703) 998-8890, http://www.thyroid.org.

Endocrine Society, 8401 Connecticut Ave., Suite 900, Chevy Chase, MD, 20815, (301) 941-0200, http://www.endosociety.org/.

Thyroid Foundation of America, One Longfellow Place, Suite 1518, Boston, MA, 02114, (800) 832-8321, http://www.tsh.org/.

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Hyssop

Description

Hyssop (*Hyssopus officinalis*) is a member of the Lamiaceae or mint family. This aromatic evergreen, classified by botanists as a sub-shrub, should not be confused with several distinct species of plants also called hyssop, including giant hyssop, hedge hyssop, prairie hyssop, or wild hyssop. Hyssop is native to southern Europe and Asia. The London surgeon and apothecary John Gerard, author of the *Herball or Generall Historie of Plantes* brought hyssop to England in 1597. The attractive herb soon became a component in many ornamental knot gardens. The sun-loving hyssop has naturalized throughout North America, and grows wild in chalky soil and on dry and rocky slopes in the Mediterranean.

Hyssop has a short and fibrous rhizome. The stalk emerges from a woody base and divides into numerous erect, square, and branching stems that may reach a height of 2 ft (61 cm). The small leaves are opposite, without stems, and lance-shaped, with fine hairs and smooth margins. They have a somewhat bitter taste. Flowers have a tubular, two-lipped corolla, and four stamens. They bloom in successive whorls in the leaf axils at the top of the stems, only growing along one side. The blooms may be in shades of rose, purple, mauve, blue, and sometimes white, depending on the variety. Hyssop comes into flower from June through October, and the blossoms are well loved by bees. The

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perennial hyssop is a sweet and warming aromatic with a camphor-like scent. This garden favorite is especially useful in companion planting. Hyssop attracts the white butterfly, a pest to cabbage and broccoli, thus sparing the food crops from the infestation. The herb also has been used to increase the yield of grapevines and the flavor of the fruit when it is planted nearby.

The Hebrew people called this herb *azob*, meaning "holy herb." Hyssop was used in ancient times as a cleansing herb for temples and other sacred places. It was also used to repel insects. The Romans used hyssop to bring protection from the plague, and prepared an herbal wine containing hyssop. In ancient Greece, the physicians Galen and Hippocrates valued hyssop for inflammations of the throat and chest, pleurisy, and other bronchial complaints. In the early seventeenth and eighteenth centuries, hyssop tea and tincture were used to treat **jaundice** and dropsy.

General use

The flowers and leaves of hyssop are considered medicinally valuable by some herbalists; however, the German Commission E has not approved hyssop for any medicinal purposes. The herb has some antimicrobial and antiviral properties. It is especially useful in helping the immune system to combat respiratory infections and colds. Hyssop, taken in a warm infusion, acts as an expectorant and will help to expel phlegm and break up congestion in the lungs. It is frequently recommended for the treatment of congested sinuses and catarrh. It is also a beneficial herb for treatment of the **cold sore** virus, *Herpes simplex*. An infusion has also been used to relieve the distress of **asthma**. Hyssop is a diaphoretic, and acts to promote perspiration. It will help to reduce fever and eliminate toxins through the skin. Hyssop also acts as a carminative and digestive aid, relieving flatulence and relaxing the digestive system. This versatile herb is also a nervine, which calms anxiety. It is useful in children's digestive and respiratory herbal formulas, as well.

Used externally as a skin wash, a decoction of the flowering tops can help the healing of **burns** and relieve skin inflammations. The fresh, crushed leaves promote healing of bruises, and relieve the discomfort of insect **bites** and stings. When applied as a hair rinse, hyssop may help eliminate head lice. Hyssop preparations have also been used to relieve muscular pain and rheumatism when taken as a tea or as a bath additive. The hot vapors of a steaming decoction of hyssop may bring relief for **earache** and inflammation.

KEY TERMS

Carminative—Any medication or preparation given to expel gas from the digestive tract.

Catarrh—Inflammation of the mucous membranes in the respiratory tract accompanied by heavy secretions.

Diaphoretic—A medication or herbal preparation given to induce or increase perspiration.

Essential oil—A concentrated oil that has been distilled from a plant, usually by the steam method.

Expectorant—A drug given to help bring up mucus or phlegm from the respiratory tract.

Infusion—A method for releasing the herbal essence of herbal leaves and flowers by pouring boiling water over the plant matter and allowing it to steep.

Nervine—A type of medication or herbal preparation given to calm the nerves.

Rhizome—A horizontal underground stem that sends up shoots from its upper surface.

Tincture—The concentrated solution of an herbal extract, usually made with alcohol.

A research study published in 2002 confirmed the results of studies done in the early 1990s, which found that hyssop leaf extract demonstrates strong anti-HIV activity. The specific compounds responsible for this antiviral action, however, were not identified in these studies. Moreover, none of these studies tested the efficacy of hyssop in human subjects. The volatile oil of hyssop contains camphene, pinenes, terpinene, the glycoside hyssopin, flavonoids (including diosmin and **hesperidin**), tannins, acids, resin, gum, and the bitter substance known as marrubiin. Marrubiin is also found in white horehound (*Marrubium vulgare*).

More recently, researchers have discovered that essential oil of hyssop is an effective muscle relaxant. The component that has been identified as most likely responsible for this effect is isopinocamphone.

Preparations

Harvest hyssop when the herb reaches a height of about 1.5 ft (46 cm). Frequent cuttings from the tops of mature plants will keep the foliage tender for use in salads, soups, or teas. Used sparingly in culinary preparations, hyssop's tender shoots are a digestive aid, especially with greasy meats. When harvesting the

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herb for medicinal uses, the flowering tops are used. Gather the herb on a sunny August day after the dew has dried. Hang the branches to dry in a warm, airy room out of direct sunlight. Remove leaves and flowers from the stems and store in clearly labeled, tightly sealed, dark-glass containers.

Infusion: Place 3 Tbsp dried, or twice as much fresh, hyssop leaf and blossom in a warm glass container. Bring 2.5 cups of fresh, nonchlorinated water to the boiling point, and add it to the herbs. Cover and infuse the tea for 10–15 minutes. Strain and drink warm. The prepared tea will store for about two days if kept in a sealed container in the refrigerator. Hyssop tea may be enjoyed by the cupful up to three times a day. Hyssop may be combined with white **horehound** for additional expectorant action to relieve coughs. For sore throats, a warm infusion of hyssop combined with sage (*Salvia officinalis*) is a home remedy recommended by some herbalists.

Tincture: Combine four ounces of finely-cut fresh or powdered dry herb with one pint of brandy, gin, or vodka, in a glass container. The alcohol should be enough to cover the plant parts. Place the mixture away from light for about two weeks, shaking several times each day. Strain and store in a tightly-capped, dark glass bottle. A standard dose is 1–2 ml of the tincture three times a day.

Essential oil: The commercially available essential oil of hyssop is obtained by steam distillation of the flowering tops. The oil is highly aromatic and is used in perfumes, **aromatherapy**, and to flavor liqueurs, especially Chartreuse and Benedictine. The oil has a warm and pungent aroma with a slight camphor-like smell. It may be used in dilute form as an external nonirritating application on **bruises**, **cuts**, eczema, and **dermatitis**, as a chest rub for bronchitis and the congestion of colds, and as an additive to bath water to relieve nervous exhaustion and melancholy.

Precautions

Only moderate amounts of hyssop essential oil should be used. Do not use the herb continuously in any form for long periods of time. Pregnant women, children, and persons with **epilepsy** should avoid any use of this potent essential oil. High doses (10–30 drops for adults) may cause convulsions due to the ketone known as pinocamphone. Pregnant or lactating women should not use any form of hyssop.

Side effects

Hyssop can cause **nausea**, upset stomach, and **diarrhea** in susceptible persons. Symptoms of overdose include **dizziness**, tightness in the chest, and disturbances of the central nervous system.

Interactions

No interactions between hyssop and standard pharmaceuticals have been reported as of early 2003.

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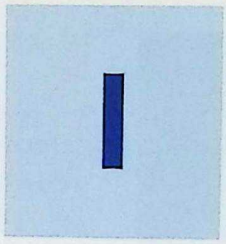

IBD *see* **Inflammatory bowel disease**

IBS *see* **Irritable bowel syndrome**

Iceland moss

Description

Iceland moss (*Cetraria islandica*) is a lichen (a moss-like plant) that grows on the ground in mountains, forests, and arctic areas. In addition to Iceland, the lichen is found in Scandinavia, Great Britain, North America, Russia, and other areas in the Northern Hemisphere. Iceland moss also grows in Antarctica.

The plant's thallus (shoot) curls from 1–4 in (2.5–10 cm) tall. The dried thallus is used as an herbal remedy. Iceland moss is also known as Iceland lichen, cetraria, fucus, muscus, and eryrngo-leaved (spiny-leaf) liverwort.

General use

Iceland moss is rich in **calcium**, **iodine**, **potassium**, phosphorous, and vitamins. The lichen is a bitter-tasting plant that is said to smell like seaweed when it is wet. Despite these unappetizing characteristics, Iceland moss has long been used in Scandinavia and Europe as a food source and a remedy for numerous conditions.

Historic uses of Iceland moss

People in countries including Iceland, Sweden, Norway, Finland, and Russia have used Iceland moss for food and medicine. When used for nourishment, the Iceland moss plant was ground into flour, which was used to bake bread. Boiling the plant was said to remove the bitter taste, so the plant was boiled and made into a jelly. The lichen became part of a gelled dessert with ingredients that could include chocolate, almonds, or lemon.

In addition, Iceland moss was boiled in milk, a beverage served as a remedy for conditions such as malnutrition. The milk-and-lichen beverage was served to sick people, frail children, and the aged. It was also used for serious conditions when the person was vomiting.

Iceland moss also had numerous folk medicine uses. The lichen was a folk remedy for **tuberculosis**, lung disease, chest ailments, and problems with the kidney and bladder. Iceland moss was also used to treat **wounds** that did not heal, **diarrhea**, problems with lactation, fevers, and **gastritis**.

Furthermore, people in Norway ate Iceland moss during a seven-year famine that started in 1807. The Russians found another use for the lichen during World War II, when they prepared a version of molasses with Iceland moss.

Contemporary uses of Iceland moss

The acids in Iceland moss have an antibiotic effect. It is a mild antimicrobial and a demulcent—a remedy that soothes irritated or inflamed mucous membranes. The lichen is used for inflammation of the mouth and pharynx, and for treatment of the **common cold**, fever, dry **cough**, and bronchitis. It is also used for people who have a tendency toward infection. Furthermore, the bitter herb is a remedy for digestive complaints, loss of appetite, and **gastroenteritis**. Iceland moss boiled in milk is still used as a tonic beverage for people recovering from illnesses. In addition, the lichen has been used to treat diabetes.

Preparations

In Europe, Iceland moss cough drops are sold in pharmacies. The lichen is also sold in other forms for a range of conditions. In the United States, Iceland moss is generally found in powdered form and is usually

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Iceland moss (Cetraria islandica). *(© Arco Images / Alamy)*

consumed as a tea. It can be used as a gargle to soothe a sore throat .

Iceland moss is made by pouring 1 cup of boiling water over 1–2 tsp of powdered Iceland moss. The mixture is covered and steeped for 10–15 minutes. Sweetener can be added to the tea, or the herb can be mixed with cocoa or chocolate. The average daily dosage of Iceland moss is 1–3 tsp.

An Iceland moss decoction can be made by putting 2 tsp of shredded lichen in 2 cups of cold water. The mixture is simmered for 10 minutes. It is then strained to squeeze out the juice. One cup of the decoction is consumed in the morning and another at night. Iceland moss can also be taken as a tincture.

In addition, Iceland moss can be used topically for skin rashes and fungus.

Precautions

Iceland moss is safe when taken in proper dosages. However, Iceland moss is not regulated by the FDA. Before beginning herbal treatment, people should consult a physician, health practitioner, or herbalist to discuss potential cautions.

Powdered Iceland moss must be soaked in lye for 24 hours or filtered through ash in order to properly extract the lichen acids. One study found that poorly prepared Iceland moss may contain toxic levels of lead. A person should talk to an experienced herbalist or other health practitioner to determine a proper source for Iceland moss, and should not attempt to prepare it oneself.

In rare cases, external use of Iceland moss has caused sensitivity reactions.

KEY TERMS

Decoction—A system for releasing the herbal essence of bark or roots that includes simmering in water.

Infusion—A system for releasing the herbal essence of leaves and flowers in which the herbs are steeped in boiled water.

Tincture—A method of preserving herbs with alcohol or water.

Side effects

Side effects include the rare sensitivity reaction, and the risk of **lead poisoning** in poorly prepared Iceland moss. In excessive doses or with prolonged use, Iceland moss may cause gastric irritation and liver problems.

Interactions

There are no known interactions associated with use of Iceland moss.

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Liz Swain

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Ignatia

Description

Ignatia is a homeopathic remedy that is derived from the bean of a small tree that is native to the Philippine Islands and China. The tree belongs to the Loganiaceae family, and has long, twining, smooth branches. On the branches grows a fruit that is the size and shape of a pear. Inside the fruit are almond-shaped seeds, or beans, that have a fine, downy covering and are blackish gray or clear brown in color.

The Latin name is *Ignatius amara*, amara being the Latin word for bitter. The bean was named after St. Ignatius Loyola, a Spanish Jesuit who was responsible for bringing the beans to Europe from the Philippines in the seventeenth century. As a result, the beans are often called St. Ignatius beans. The missionaries were introduced to the beans by the locals, who wore the beans as amulets to prevent disease. The bean was then used as a treatment for **gout**, **epilepsy**, cholera, and **asthma**.

The beans contain a substantial amount of strychnine, a bitter substance that is often used in rat poison. Strychnine is fatal to humans if taken in large doses. Small doses cause headaches, loss of appetite, cramps, muscle twitching, trembling, frightening dreams, cold sweat, nervous laughter, and giddiness.

General use

Ignatia is one of the best remedies for conditions brought about by emotional upset such as grief, shock, jealousy, fear, anger, **depression**, embarrassment, fright, or ridicule. Homeopaths frequently recommend ignatia when the patient is suffering from romantic disappointment or the loss of a spouse, relative, friend, or pet. The remedy helps the patient bear the grief and suffering common to emotional upsets.

Suppression of the emotions is the general cause of ignatia complaints. Men and women of all ages may benefit from ignatia when they are grieving, but ignatia is particularly well suited for sensitive, delicate women and children. It is recommended for children who develop ailments after being punished, teenagers who are suffering from a lost love, women who have had a miscarriage, and elderly folk who grieve silently. Ignatia is a good remedy for children who suffer from extreme trembling after a fright. Ignatia is frequently prescribed in cases of physical or sexual abuse. Women who suffer from nervousness, confusion, or forgetfulness during their menstrual cycles may also benefit from ignatia.

KEY TERMS

Succussion—A process integral to the creation of a homeopathic remedy in which a homeopathic solution is struck against a firm surface. This is performed to thoroughly mix the substance and magnify its healing properties.

Persons who require the interaction of ignatia are idealistic, introspective, moody, quarrelsome, sensitive to **pain**, timid, easily startled, weepy, and depressed. As a result of their grief they become fearful, apprehensive, and antisocial. They dislike consolation and desire to be alone. When in the company of others they are secretive and try to hold in their emotions, although they sigh frequently and loudly. When alone, they are prone to frequent bouts of sobbing alternating with nervous laughter. They are conscientious about performing tasks correctly.

Ignatia is a remedy of contradictions. Symptoms are often paradoxical and erratic. For example, symptoms of **nausea** are relieved by eating, a **sore throat** is better from swallowing solids, and simple foods are harder to digest than heavier foods. Symptoms may be relieved after passing a hard stool. Lying on the painful side may make the symptoms better. Eating causes the patient to have more hunger. She may crave sour or hard to digest foods. She may also want to remain uncovered when cold. The patient dislikes fresh air and is sensitive to coffee and tobacco.

General symptoms are aggravated by cold air, emotional excitement, mental exertion, sweets, and consolation. They are worse in the morning, evening, night, and before and during **menstruation**. Symptoms may appear at regular intervals, such as headaches that occur every seven days. Symptoms are improved by warmth and eating.

Ignatia is also used as a remedy for headaches, sore throat, trembling, nervousness, **insomnia**, heart palpitations, **gas**, **indigestion**, weakness, and weeping. Other conditions include **irritable bowel syndrome**, painful **hemorrhoids**, or a dry, tickling **cough**.

The cough is a dry, irritating cough that is often accompanied by a stitching pain in the chest. Suppression of the cough is helpful. The patient is made worse by coughing or lying in bed, and the cough is worse in the evening. Ignatia is often used in the treatment of **whooping cough** or **croup**.

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The **fever** is often accompanied by extreme thirst and **chills**. The patient feels better when uncovered, and is worse in the afternoon.

Headaches typical of ignatia start gradually and stop suddenly. The pain is gathered in the forehead. The patient may complain of a sensation as if a nail were being driven through her head. Headaches are often caused by emotional upset and are worse in a smoky room.

A sore throat accompanied by stitching pains and a sensation as if there were a lump in the throat is often present as a result of suppressed emotions. The throat is worse in the evening and is better from swallowing.

When indigestion is present, the patient may feel as though her stomach were empty. She may suffer from sour-tasting belches that ameliorate her symptoms.

Preparations

Ignatia is prepared by grinding the bean into a powder and steeping the powder in alcohol. The mixture is strained and diluted until it becomes a non-toxic substance. It is then succussed to create the final preparation.

During an emotional crisis, take a single dose of 30X or 30C. If the symptoms are unchanged after eight hours, try another remedy. If the dose helps, repeat the dose only when the symptoms worsen. Do not take more than two times a day for three days.

Precautions

If symptoms do not improve after the recommended time period, consult your homeopath or health-care practitioner.

Do not exceed the recommended dose.

Ignatia may cause insomnia and should be taken in the morning.

Side effects

The only side effects are individual aggravations that may occur.

Interactions

When taking any homeopathic remedy, do not use **peppermint** products, coffee, or alcohol. These products may cause the remedy to be ineffective.

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Jennifer Wurges

Imagery *see* **Guided imagery**

Immuno-augmentation therapy

Definition

Immuno-augmentation therapy (IAT), also called immuno-augmentative or immuno-augmentive therapy, is a **cancer** treatment aimed at restoring the immune system with injections of a mixture of blood factors.

Origins

Dr. Lawrence Burton formulated the theory behind IAT in the 1950s. After earning his doctorate in experimental zoology in 1955 from New York University, Burton moved to the California Institute of Technology (Caltech) as a postdoctoral fellow in the laboratory of H. K. Mitchell. There, he and his coworkers discovered a tumor-inducing factor (TIF) in fruit flies. A few years later, Burton and his colleague, Dr. Frank Friedman, joined the cancer research staff of Dr. Antonio Rottino at St. Vincent's Hospital in New York City. Rottino was one of the first scientists to conclude that a connection existed between the body's immune system and cancer.

Burton and the development of IAT

Burton and his colleagues reported finding an inhibitor of fruit-fly TIF in mice and human tissue, but afterward, Mitchell published a retraction of the papers he had coauthored with Burton. Mitchell claimed that Burton's assay for TIF—on which Burton was basing his recent work—could not be repeated independently. Undeterred, Burton continued using fruit flies and mice to develop a mixture of blood proteins to slow or stop the proliferation of cancer cells.

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By the mid-1960s, Burton was making sensational presentations. In 1966, at an American Cancer Society (ACS) seminar for science writers, Burton injected mice with his "unblocking factor," and their tumors shrunk in less than an hour. Although newspaper headlines read "15-Minute Cancer Cure," the medical community was unconvinced. Professional journals refused to publish Burton's papers and he eventually lost his research funding. The American Cancer Society (ACS) placed Burton's IAT on its list of unproven methods.

In 1973, Burton and Friedman left St. Vincent's and, with independent funding, founded the Immunology Researching Foundation in Great Neck, New York. They began treating cancer patients with IAT. The following year they submitted an investigational new drug application to the United States Food and Drug Administration (FDA) in order to begin clinical trials of IAT. When FDA officials asked for his experimental evidence, however, Burton withdrew his application.

Burton and Friedman eventually patented four substances that they claimed to have isolated from human blood:

- deblocking protein
- tumor antibody 1
- tumor antibody 2
- tumor complementBurton claimed that when used in the correct combination, these substances restored normal immune function in cancer patients.

During the 1970s and early 1980s, the National Cancer Institute (NCI) tried to evaluate IAT. Burton refused to disclose his methods for isolating his blood substances, and and the NCI and Burton could not reach an agreement regarding evaluation methods.

The Bahamian clinic

Hostility from the medical establishment drove Burton to close his New York clinic in 1977. With private funding, he founded the Immunology Researching Centre (IRC), Ltd. in Freeport on Grand Bahama Island. This not-for-profit organization was licensed to treat people who had been diagnosed with cancer. In 1978, representatives from the Bahamian Ministry of Health and the Pan American Health Organization found violations in admissions, treatment, and evaluation of the clinic's patients. They could not determine the blood components used in IAT, and found no records of patient survival rates. They concluded that there was no evidence that IAT was effective, and recommended that the facility be closed.

Nonetheless, the Bahamian health authority did not shut down the clinic until 1985. At that time, blood supplies across the United States had been found to be contaminated with the human immunodeficiency virus (HIV) and Burton's clinic was no exception. Indeed, the clinic had treated Kaposi's sarcoma in patients with acquired immune deficiency syndrome (**AIDS**). Although no HIV **infections** were ever traced to the clinic, and some scientists questioned the HIV screening used by the authorities, the sera used in IAT were found to carry **hepatitis** virus and infectious bacteria. At least two cases of hepatitis were traced to the sera. The Bahamian government, at the apparent insistence of the FDA and the NCI, closed the Burton's clinic for seven months, until screening and sterilization methods for serum production were improved.

Shortly thereafter, the FDA banned the import of IAT drugs. IAT had been legalized in Florida and Oklahoma in the early 1980s, although Florida rescinded its law when the clinic closed.

The closing of Burton's clinic and the ban on sera import enraged many patients and their families. They formed the Immuno-Augmentative Therapy Patient Association (IATPA), later renamed People Against Cancer, and began lobbying the United States Congress. In 1986, the Office of Technology Assessment (OTA), then a research branch of Congress, was told to investigate alternative cancer therapies. OTA worked with Burton to develop procedures for an IAT clinical trial on colon cancer patients, but the arrangement broke down, and the OTA concluded that no reliable data existed with which to evaluate IAT.

During the 1990s, the Burton's Immunology Researching Centre opened additional clinics in Germany and Mexico. Burton died in 1993 and his longtime associate, Dr. R. John Clement, took over IRC operations. In 2003, Clement founded the ITL Cancer Clinic, a new operating company for the IRC. This new, expanded clinic began offering cancer vaccines, and additional mainstream and alternative treatments combined with IAT.

Benefits

Proponents claim that the therapy can stop the spread of many cancers and may send the cancer into remission. They claim that by treating deficiencies or imbalances in the immune system, the body is able treat itself, resulting in an extended lifespan and enhanced quality of life. They note, however, that sometimes the disease has spread too far within the body to respond to IAT. Furthermore, if chemotherapy or radiation treatment has over-suppressed the immune system, response to IAT may be slow.

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IAT has been claimed to have about a 19 percent effectiveness rate, but various cancers respond differently:

- Bladder cancer responds favorably.
- Brain cancer: astrocytomas (non-capsulated brain tumors arising in brain cells called astrocytes), grades I and II, respond favorably; grade III does not respond well; glioblastoma multiforme (the fastest-growing type of brain tumor) is not a candidate for IAT.
- Breast cancer: all types respond, although inflammatory cancers respond poorly.
- Cervical cancer: responds in early stages; mixed results in late stages.
- Colorectal cancer: good response in most stages; metastasis to the liver disqualifies it for IAT.
- Head and neck cancers respond favorably.
- Leukemias: adult chronic types respond to IAT.
- Lung cancers: adeno- and squamous-cell (large-cell) cancers and mesotheliomas respond well to IAT; small-cell, oat-cell, and undifferentiated cancers are not candidates for IAT.
- Lymphoma: responses vary.
- Melanomas: extremely variable responses.
- Myeloma responds well, even at late stages.
- Pancreatic cancer: good response in some cases, although IAT may be inappropriate because of disease complications.
- Prostate cancer responds at all stages.
- Skin metastasis does not respond to IAT.

Description

Both conventional cancer immunotherapy and IAT are based on enhancement of the immune system. Sometimes called immune enhancement or immune modulation, conventional immunotherapy is used at many U. S. clinics. Clinical trials have found conventional immunotherapy useful for treating various cancers, including melanoma, lymphoma, kidney, and bladder cancers.

IAT components and treatment

Three serum factors are used in IAT:

- Tumor antibody factor (TAF), more commonly called tumor necrosis factor (TNF), may induce antibodies that destroy tumors.
- Tumor complement factor (TCF) is said to induce antibody formation.
- De-blocking protein factor (DPF) is claimed to remove an endogenous blocking protein that prevents the immune system from detecting the cancer.TAF and DPF are isolated from the blood of healthy donors. TCF is isolated from the clotted blood of cancer patients.

IAT patients are screened for imbalances in immune system components. During the initial treatment, blood factors are measured once or twice per day, five days per week. In addition to measuring the serum factors used in treatment, the blood is analyzed for blocking protein factor (BPF). High levels of BPF and low levels of DPF and TCF are claimed to cause immunosuppression or immunodeficiency, enabling the cancer to grow and spread. This data determines the amount of each serum to be injected into the patient.

Treatment varies from one to 12 daily injections. Treatment is on an outpatient basis for an average of 10–12 weeks. Following outpatient treatment, patients are given supplies of sera and a computerized prescription for home injections. Home treatment may last weeks, months, or the rest of one's life. Patients typically return to the clinic for about two weeks, every four to six months. They undergo measurements of tumor activity and IAT responses, in conjunction with conventional methods for determining tumor regression, and symptom and disease remission.

Approximate costs

IAT is expensive:

- Four weeks of initial and intensive therapy—$7,500.
- Each week thereafter—$700.
- Home maintenance supplies—$50 per week.

These fees do not include:

- Special medications or nutrients not used in routine IAT.
- Laboratory or other tests performed outside of the clinic.
- Outside physician or hospital services.
- Medical aids or equipment not prescribed or supplied by the clinic.
- Transportation, lodging, and living expenses during outpatient treatment.IAT usually is not covered by insurance.

Preparations

Under Bahamian law, IAT patients must have been previously diagnosed with cancer. Patients are screened to determine if IAT is appropriate for their type of cancer. Typically, patients travel to an IAT clinic, where they receive a physical exam, and blood and urine tests to determine the status of their immune

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KEY TERMS

Adenocarcinoma—A cancerous tumor derived from epithelial (surface) cells or a gland-like tumor.

Antibody—A protein that recognizes and destroys a specific foreign antigen, such as a cancer cell.

Best-case series—A preliminary study that relies on assumptions about patient outcomes without a specific treatment, compared with similar patients receiving the best available conventional treatments. There are no control cases.

Blocking protein factor (BPF)—A serum component that may prevent the immune system from recognizing cancer cells.

Complement—A large group of serum proteins that are involved in the immune response.

De-blocking protein factor (DPF)—A serum component used in IAT that is claimed to inactivate or remove BPF.

Immune system—The body system that fights infection and disease.

Mesothelioma—A tumor consisting of spindle cells or fibrous tissue, usually in the lining of the lung.

Metastasis, pl. metastases—A secondary tumor; the process by which cancerous cells form secondary tumors in distant parts of the body.

Serum, pl. sera—The clear liquid that remains after cellular components are removed from blood by clotting; a blood derivative containing an antitoxin for diagnostic or therapeutic use.

Tumor—An overgrowth of body tissue.

Tumor antibody factor (TAF)—A component of IAT sera, possibly tumor necrosis factor (TNF), that may induce antibodies that destroy tumors.

Tumor complement factor (TCF)—A component of IAT sera that stimulates antibody production.

Tumor-inducing factor (TIF)—A blood component that can initiate tumor growth.

system. IAT appears to be more effective among patients who have not had chemotherapy.

IAT patients are asked to abstain from tobacco and to limit alcohol consumption during treatment. **Lung cancer** patients must have stopped **smoking** prior to treatment at the IRC. In addition, patients should:

- Avoid dietary animal fats
- Avoid excess vitamin C
- Take antioxidant supplements that are recommended

Precautions

Proponents of IAT claim that it is nontoxic, safe, and effective. However, there have been no controlled clinical studies of IAT, and scientists have not been able to replicate Burton's original results with mice. In addition:

- IAT sera have not been tested for safety by accepted medical standards.
- Some medical practitioners caution that the unregulated IAT sera may contain infectious agents transmitted in human blood.
- Relying on IAT in place of conventional cancer treatments may have serious health consequences.

Side effects

Anecdotal reports from patients indicate that the side effects of IAT are minor and include:

- Fatigue
- Pain at the injection site
- Flu-like symptoms
- Pain and edema (fluid accumulation) during IAT given to bone cancer patients

Research and general acceptance

There is no scientific evidence that IAT is an effective cancer treatment. In addition, there is no scientific evidence that IAT sera contain specific components. In 1980, MetPath, a biomedical firm, terminated a contract with Burton after they could not identify or measure a substance that Burton claimed was present in IAT serum. Most anecdotal claims and testimonials for IAT's effectiveness against cancer are without supporting evidence.

In 1984, researchers at the University of Pennsylvania Cancer Center collected data from 79 patients who had received IAT at Burton's clinic. They concluded that reliable comparisons with those receiving conventional cancer treatment were not possible; however, their survey did find extended survival times among the IAT patients. They suggested that a well-controlled prospective study be performed.

In April 2003, the United States Agency for Healthcare Research and Quality (AHRQ) issued a report on IAT. Using criteria developed by the NCI, they conducted a "best-case series" to examine nine cancer patients treated with IAT. Their cancers included:

- Hodgkin's lymphoma
- Non-small cell carcinoma of the lung

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- Poorly differentiated nodular lymphoma
- Peritoneal mesothelioma (two cases)
- Ovarian adenocarcinoma
- Squamous cell carcinoma of the vocal cords (two cases)
- Adenocarcinoma of the colonThe report concluded that IAT warranted further study. It recommended either a random controlled clinical trial or a prospective case series with treatment protocol and documentation established prior to treatment. Also in 2003, however, a research study from the Samueli Institute for Information Biology in Virginia tested 46 patients who were undergoing IAT treatment. The researchers found no indication of effectiveness, nor any improvement in the patients' quality of life.

Training and certification

IAT practitioners are usually medical doctors.

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Impetigo

Definition

Impetigo is a contagious bacterial infection of the skin. It primarily afflicts children and the elderly. Ecthyma is a more severe form of impetigo with sores affecting a deeper layer of the skin. It often leaves scarring and discoloration of the skin.

Description

The first sign of impetigo is a clear, fluid-filled bump, called a vesicle, which appears on the skin. The vesicle soon dries out and develops a scab-like, honey-colored crust, which breaks open and leaks fluid. These vesicles usually appear grouped closely together, and they may spread out and cover a large area of the skin. Impetigo often affects the area around the nose and mouth; however, it can spread to anywhere on the skin, but especially the arms and legs, as well as the diaper areas of infants. The condition called ecthyma is a form of impetigo in which the sores that develop are larger, filled with pus, and covered with brownish-black scabs that may lead to scarring. Impetigo **infections** most commonly occur during warmer weather.

Impetigo on a patient's foot. *(ISM/Phototake, Reproduced by permission.)*

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Causes and symptoms

Impetigo is most frequently caused by the bacteria *Staphylococcus aureus,* also known as staph, and less frequently, by group A beta-hemolytic streptococci, also known as strep. These bacteria are highly contagious. Impetigo can quickly spread from one part of the body to another through scratching. It can also be spread to other people if they touch the infected sores or if they have contact with the soiled clothing, diapers, bed sheets, or toys of an infected person. Factors such as heat, humidity, crowded conditions, and poor hygiene increase the chance that impetigo will spread rapidly among large groups.

Impetigo tends to develop in areas of the skin which have already been damaged through some other means such as injury, insect bite, **sunburn**, **diaper rash**, chicken pox, or herpes, especially oral herpes. The sores tend to be very itchy, and scratching may lead to the spread of the disease. Keeping the hands washed with antibacterial soap, and fingernails well trimmed are good precautions for limiting further infection.

Diagnosis

Observation of the appearance, location, and pattern of sores is the usual method of diagnosis. Fluid from the vesicles can be cultured and examined to identify the causative bacteria.

Treatment

Echinacea tincture can be applied directly to the skin. The homeopathic remedy *Antimonium tartaricum* can be used when impetigo affects the face.

Bag Balm, an anti-bacterial salve, can be applied to sores to relieve **pain** and heal the skin.

A tincture of the pansy flower, *Viola tricolor,* can be taken internally twice daily for a week to speed healing.

Burdock root oil can be directly applied to the skin to help it heal.

Topical washes with **goldenseal**, **grapefruit seed extract** (which may sting), or **tea tree oil** are also recommended.

Allopathic treatment

Uncomplicated impetigo is usually treated with a topical antibiotic cream such as mupirocin (Bactroban). Oral antibiotics are also commonly prescribed. Patients are advised to wash the affected areas with an antibacterial soap and water several times per day and to otherwise keep the skin dry. Scratching is discouraged, and the suggestion is that nails be cut or that mittens be worn—especially with young children. Ecthyma is treated in the same manner but at times may require surgical debridement, or removal of the affected area.

KEY TERMS

Sequela—Any abnormal condition that follows as the result of a disease or injury.

Systemic—Involving the whole body; the opposite of localized.

Expected results

The vast majority of those with impetigo recover quickly, completely, and uneventfully. However, there is a chance of developing a serious disease, or sequela, especially if the infection is left untreated. Local spread of the infection can cause osteomyelitis, septic arthritis, cellulitis, or lymphangitis. If large quantities of the bacteria begin to circulate in the bloodstream, there is also a danger of a systemic infection developing, such as glomerulonephritis or **pneumonia**.

Prevention

Prevention of impetigo involves good hygiene. In order to avoid spreading the infection from one person to another, those with impetigo should be isolated until all sores are healed, and their used linen, clothing, and toys should be kept out of contact with others.

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Patience Paradox
David Edward Newton, Ed.D.

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Impotence

Definition

Impotence, also known as erectile dysfunction (ED), is the inability to achieve or maintain an erection long enough to engage in sexual intercourse.

Description

Under normal circumstances, when a man is sexually stimulated, his brain sends a message down the spinal cord and into the nerves of the penis. The nerve endings in the penis release chemical messengers, called neurotransmitters, that signal the arteries that supply blood to the corpora cavernosa (the two spongy rods of tissue that span the length of the penis) to relax and fill with blood. As they expand, the corpora cavernosa close off other veins that would normally drain blood from the penis. As the penis becomes engorged with blood, it enlarges and stiffens, causing an erection. Problems with blood vessels, nerves, or tissues of the penis can interfere with an erection.

Causes and symptoms

Estimates of the rate of impotence vary widely. A 2006 review of 13 studies on ED completed prior to 1998 reported on the Public Library of Science (PLoS) Web site found impotency rates ranging from 1% to more than 70%, depending on age, nationality, health status, and other factors. The figure most commonly quoted for the prevalence of ED among American males appears to be between 15 and 30 million, again depending on a number of personal factors. The PLoS article points out that estimates of the prevalence of ED are not a purely scientific issue. Drug manufacturers who make medications for the treatment of the disorder may wish to inflate the actual number of cases to broaden the appeal of their product.

In any case, medical views on impotence have changed significantly over the past few decades. For example, as of 2008, the disorder was being diagnosed much more commonly than it had been previously. A study conducted as part of the National Ambulatory Medical Care Survey in 1998 found that the rate of impotence cases reported at physician's offices had nearly tripled between 1985 and 1999, from 7.7 per 1,000 visits for 1985 to 22.3 visits per 1,000 in 1999. At one time, doctors thought that most cases of impotence were psychological in origin. They later recognized that, at least in older men, physical causes may play a primary role in 60% or more of all cases. In men over the age of 60, the leading cause is **atherosclerosis**, or narrowing of the arteries, which can restrict the flow of blood to the penis. Injury or disease of the connective tissue, such as Peyronie's disease, may prevent the corpora cavernosa from completely expanding. Damage to the nerves of the penis from certain types of surgery or neurological conditions, such as Parkinson's disease or **multiple sclerosis**, may also cause impotence. Men with diabetes are especially at risk for impotence because of their high risk of both atherosclerosis and a nerve disease called diabetic neuropathy.

Some drugs, including certain types of blood pressure medications, antihistamines, tranquilizers (especially before intercourse), and antidepressants known as selective serotonin reuptake inhibitors (SSRIs, including Prozac and Paxil) can interfere with erections. **Smoking**, excessive alcohol consumption, and illicit drug use may also contribute. In some cases, low levels of the male hormone testosterone may contribute to erectile failure. Finally, psychological factors, such as **stress**, guilt, or **anxiety**, may also play a role, even when the impotence is primarily due to organic causes.

Diagnosis

When diagnosing the underlying cause of impotence, the doctor begins by asking the man a number of questions about when the problem began, whether it happens only with specific sex partners, and whether he ever wakes up with an erection. (Men whose dysfunction occurs only with certain partners or who wake up with erections are more likely to have a psychological cause for their impotence.) Sometimes, the man's sex partner is also interviewed. In some cases, domestic discord may be a factor.

The doctor also obtains a thorough medical history to find out about past pelvic surgery, diabetes, cardiovascular disease, kidney disease, and any medications the man may be taking. The physical examination should include a genital examination, hormone tests, and a glucose test for diabetes. Sometimes a measurement of blood flow through the penis may be taken.

Alternative health practitioners often forgo such extensive testing and rely on information obtained from the patient. Usually the fact that the man cannot get or maintain an erection is reason enough to begin alternative or holistic therapy.

Treatment

A number of herbs have been promoted for treating impotence. The most widely touted is **yohimbe**

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(*Corynanthe yohimbe*), derived from the bark of the yohimbe tree native to West Africa. It was used in Europe for for most of the twentieth century to treat erectile dysfunction. In the United States, yohimbe products are available in two formats. One is a prescription drug that contains yohimbine, the active ingredient in yohimbe bark. This drug has been approved by the U.S. Food and Drug Administration (FDA) for use with ED and some other medical problems. It is available under a number of trade names, including Yocon, Aphrodyne, Erex, Yohimex, Testomar, Yohimbe, and Yovital. The second form includes a variety of supplements that contain more or less of the natural product. As a dietary supplement, this form of yohimbe is not regulated by the FDA. In fact, the agency strongly recommends against use of the product because of its very serious side effects, which may include paralysis, **fatigue**, stomach disorders, and even death.

There is no clear medical research that indicates exactly how or why yohimbe works in treating impotence. It is generally believed that yohimbe dilates blood vessels and stimulates blood flow to the penis, causing an erection. It also prevents blood from flowing out of the penis during an erection. It may also act on the central nervous system, specifically the lower spinal cord area where sexual signals are transmitted. Studies show it is effective in 30–40% of men with impotence. It is primarily effective in men with impotence caused by vascular, psychogenic (originating in the mind), or diabetic problems. It usually does not work in men whose impotence is caused by organic nerve damage. In healthy men without impotence, yohimbe in some cases appears to increase sexual stamina and prolong erections.

The usual dosage of yohimbine (yohimbe extract) to treat erectile dysfunction is 5.4 mg three times a day. It may take three to six weeks for it to take effect. Most commercially available supplements do not contain enough yohimbe to be effective and doctors recommend obtaining a prescription for yohimbe to get enough active ingredient to meet with success.

Ginkgo (*Ginkgo biloba*) is also used to treat impotence, although it has not been shown to help the condition in controlled studies and probably has more of a psychological effect. In addition, ginkgo carries some risk of abnormal blood clotting and should be avoided by men taking blood thinners, such as coumadin. Other herbs promoted for treating impotence include true unicorn root (*Aletrius farinosa*), **saw palmetto** (*Serenoa repens*), ginseng (*Panax ginseng*), and **Siberian ginseng** (*Eleuthrococcus senticosus*). Nux vomica (*Strychnos nux-vomica*) has been recommended, especially when impotence is caused by excessive alcohol, cigarettes, or dietary indiscretions. Nux vomica can be very toxic if taken improperly, so it should be used only under the strict supervision of a physician trained in its use.

A number of Chinese herbal remedies are available for treatment of impotence, usually combinations of herbs and sometimes such animal parts as deer antler and sea horse.

Allopathic treatment

Years ago, the standard treatment for impotence was a penile implant or long-term **psychotherapy**. Although physical causes are in the late 2000s more readily diagnosed and treated, individual or marital counseling is still an effective treatment for impotence when emotional factors play a role. Fortunately, other approaches are available to treat the physical causes of impotence.

The first drug developed for the treatment of ED was sildenafil citrate, sold under the brand name Viagra. It quickly became one of the most dramatic commercial successes in drug history. In the two-year period following its approval by the FDA in March 1998, sales reached more than a billion dollars annually. In 2007, worldwide sales were still high, at $1.76 billion. Viagra is a very effective treatment for ED, with a success rate of more than 60%. The drug boosts levels of a substance called cyclic GMP, which is responsible for widening the blood vessels of the penis. In clinical studies, Viagra produced headaches in 16% of men who took it, and other side effects included flushing, **indigestion**, and stuffy nose.

The primary drawback to Viagra, which works about an hour after it is taken, is that the FDA cautions men with **heart disease** or low blood pressure to be thoroughly examined by a physician before obtaining a prescription. At least 130 men have died while taking Viagra. Shortly after use of the drug skyrocketed, concerns were expressed over cardiovascular effects from Viagra. However, studies reported in 2002 that sildenafil had no effect on cardiac symptoms in older men who used it. Instead, cardiac events reported with use of Viagra are more likely the result of the physical demands of sexual activity in patients using the drug who were already at higher risk for cardiovascular disease.

In 2003, the FDA approved two additional drugs for the treatment of ED, vardenafil (Levitra) and tadalafil (Cialis). The three drugs all work in essentially the same way and have about the same success rate. Manufacturers claim that one or the other works

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KEY TERMS

Atherosclerosis—A disorder in which plaques of cholesterol, lipids, and other debris build up on the inner walls of arteries, narrowing them.

Cialis—Trade name for tadalafil, an oral medication for the treatment of impotence.

Corpus cavernosum (plural, corpora cavernosa)—One of two rods of spongy tissue in the penis that become engorged with blood in order to produce an erection.

Gene therapy—A method of treating a disorder by replacing damaged or abnormal genes with normal ones. Some researchers think that gene therapy may offer a new way to treat impotence.

Levitra—Trade name for vardenafil, an oral medication for the treatment of impotence.

Neurotransmitters—Chemicals that modify or help transmit impulses across nerve synapses.

Penile implant—An artificial device inserted by surgery in the penis to produce an erection. Implantation of rigid or semi-rigid bars produces a permanent erection; use of an inflatable device allows the man to produce an erection at will.

Peyronie's disease—A disease resulting from scarring of the corpus cavernosa, which causes painful erections.

Topical—A type of medication that is applied to a specific and limited area of skin and affects only the area to which it is applied.

Urethra—The small tube that drains urine from the bladder and in men serves as a conduit for semen during ejaculation.

Viagra—Trade name of an orally administered drug for erectile failure first cleared for marketing in the United States in March 1998. Its generic name is sildenafil citrate.

faster, has fewer side effects, and lasts longer, but such differences are relatively insignificant.

Other medications under investigation as treatments for impotence are topical agents, which means that they are applied externally to the skin rather than being injected or taken by mouth. If approved, these drugs would provide a noninvasive alternative for men who cannot take sildenafil, vardenafil, tadalafil, or other oral medications for impotence. In November 2007, the FDA accepted a new drug application filed by NexMed, Inc., for its topical ointment containing the compound alprostadil for treatment of impotence.

Other traditional therapies for impotence include vacuum pump therapy, injection therapy involving injecting a substance into the penis to enhance blood flow, and a penile implantation device. In rare cases, if narrowed or diseased veins are responsible for impotence, surgeons may reroute the blood flow into the corpus cavernosa or remove leaking vessels.

A later approach to the treatment of erectile dysfunction is gene therapy. As of early 2008, several preclinical studies had shown promise, but none of the gene-based strategies at the time had been tested for safety.

Expected results

With proper diagnosis, impotence can nearly always be treated or coped with successfully. Unfortunately, fewer than 10% of impotent men seek treatment.

Prevention

There is no specific treatment to prevent impotence. Perhaps the most important measure is to maintain general good health and avoid atherosclerosis by exercising regularly, controlling weight, controlling **hypertension** and high **cholesterol** levels, and not smoking. Avoiding excessive alcohol intake may also help.

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American Urological Association Foundation, 1000 Corporate Bvld., Linthicum, MD, 21090, (866) 746-4282, http://www.auafoundation.org/.

National Kidney and Urologic Diseases Information Clearinghouse, 3 Information Way, Bethesda, MD, 20892-3580, 800 891-5390, http://kidney.niddk.nih.gov/.

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Indian medicine *see* **Ayurvedic medicine**

Indian paint *see* **Bloodroot; Goldenseal**

Indian plantago *see* **Psyllium**

Indian tobacco *see* **Lobelia**

Indigestion

Definition

Indigestion, which is sometimes called dyspepsia, is a general term covering a group of nonspecific symptoms in the digestive tract. It is often described as a feeling of fullness, bloating, **nausea**, **heartburn**, or gassy discomfort in the chest or abdomen. The symptoms develop during meals or shortly afterward. In approximately 44% of cases, indigestion is a minor problem that often clears up without professional treatment. Researchers believe, however, that chronic heartburn can lead to more serious disorders, such as esophageal **cancer**. It is also important for patients with indigestion to be evaluated for a possible cardiac disease.

Description

Indigestion, or dyspepsia, is a widespread condition, estimated to occur in 25% of the adult population of the United States. Most people with indigestion do not feel sick enough to see a doctor; nonetheless, it is a common reason for office visits. About 3% of visits to primary-care doctors are for indigestion.

Effective therapies for indigestion

Therapy	Description
Acupressure	Massage the soft flesh between the thumb and pointer finger (Large Intestine 4) and press two fingers width away from the navel on both sides of the stomach (Stomach 25)
Aromatherapy	Ingest one drop of tarragon, marjoram, or rosemary accompanied by honey or other edible oils (safflower, almond, etc.)
Herbal medicine	Lavender, chamomile, peppermint, goldenseal, or lemon balm tea
Hydrotherapy	Hot water bottle or hot compresses on abdomen
Massage	Abdominal massage
Traditional Chinese medicine (TCM)	Chinese herbal formulas such as Po Chai and Pill Curing

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Causes and symptoms

Physical causes

The symptoms associated with indigestion have a variety of possible physical causes, ranging from commonplace food items to serious systemic disorders:

- Diet. Milk, milk products, alcoholic beverages, tea, and coffee cause indigestion in some people because they stimulate the stomach's production of acid.
- Medications. Certain prescription drugs as well as over-the-counter medications can irritate the stomach lining. These medications include nonsteroidal anti-inflammatory drugs (NSAIDs, or over-the-counter pain killers such as aspirin), some antibiotics, digoxin, calcium antagonists, nitrates, theophylline, corticosteroids, iron (ferrous sulfate), oral contraceptives, and tricyclic antidepressants.
- Disorders of the pancreas and gallbladder. These include inflammation of the gallbladder or pancreas, cancer of the pancreas, and gallstones.
- Intestinal parasites. Parasitic infections that cause indigestion include amebiasis, fluke and tapeworm infections, giardiasis, and strongyloidiasis.
- Systemic disorders, including diabetes, thyroid disease, and collagen vascular disease.
- Cancers of the digestive tract.
- Conditions associated with women's reproductive organs. These conditions include menstrual cramps, pregnancy, and pelvic inflammatory disease.

Psychological & emotional causes

Indigestion often accompanies an emotional upset because the part of the nervous system involved in the so-called fight-or-flight response also affects the digestive tract. People diagnosed with **anxiety** or somatoform disorders frequently have problems with indigestion. Many people in the general population, however, also experience heartburn, what is commonly called butterflies in the stomach, or stomach cramps when they are in upsetting situations—such as school examinations, arguments with family members, crises in their workplace, and so on. Some people's digestive systems appear to react more intensely to emotional **stress** due to hypersensitive nerve endings in their intestinal tract.

Specific gastrointestinal disorders

In some cases, the patient's description of the symptoms suggests a specific digestive disorder as the cause of the indigestion. Some doctors classify these cases into three groups:

ESOPHAGITIS TYPE. Esophagitis is an inflammation of the tube that carries food from the throat to the stomach (the esophagus). The tissues of the esophagus can become irritated by the flow (reflux) of stomach acid backward into the lower part of the esophagus. If the patient describes the indigestion in terms of frequent or intense heartburn, the doctor considers gastroesophageal reflux disease (GERD) as a possible cause. GERD is a common disorder in the general population, affecting about 30% of adults. In 2001, a study showed that **obesity** impairs the antireflux action. Those who are overweight have more severe reflux than most patients. Nighttime GERD affects 79% of adults with heartburn and is potentially more destructive to the esophagus than daytime indigestion. Another study found that acid reflux leads to **cough** and **wheezing** problems, particularly in people with **asthma**.

GERD also affects some infants and children and is a common cause of babies' spitting up formula. In most cases, the condition resolves itself, but children older than one year with regularly occurring **pain** in the lower chest or upper abdomen should cause concern. If a child is bothered by these symptoms during sleep or activities, a physician should be consulted.

PEPTIC ULCER TYPE. Patients who smoke and are over 45 are more likely to have indigestion of the peptic ulcer type. This group also includes people who find that their indigestion is relieved by taking antacids or eating a small amount of food. Patients in this category are often found to have *Helicobacter pylori* **infections**. *H. pylori* is a rod-shaped bacterium that lives in the tissues of the stomach and causes irritation of the mucous lining of the stomach walls. Most people with *H. pylori* infections do not develop chronic indigestion, but the organism appears to cause peptic ulcer disease (PUD) in a vulnerable segment of the population.

NONULCER TYPE. Most cases of chronic indigestion—as many as 65%—fall into this third category. Nonulcer dyspepsia is sometimes called functional dyspepsia because it appears to be related to abnormalities in the way that the stomach empties its contents into the intestine. In some people, the stomach empties either too slowly or too rapidly. In others, the stomach's muscular contractions are irregular and uncoordinated. These disorders of stomach movement (motility) may be caused by hypersensitive nerve endings in the stomach tissues. Patients in this group are likely to be younger than 45 and have a history of taking medications for anxiety or **depression**.

Diagnosis

Patient history

Because indigestion is a nonspecific set of symptoms, patients who feel sick enough to seek medical

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attention are likely to go to their primary-care doctor. The history does not always point to an obvious diagnosis. The doctor can, however, use the process of history-taking to evaluate the patient's mood or emotional state in order to assess the possibility of a psychiatric disturbance. In addition, asking about the location, intensity, timing, and recurrence of the indigestion can help the doctor weigh the different diagnostic possibilities.

An important part of the history-taking is asking about symptoms that may indicate a serious illness. These warning symptoms include:

- weight loss
- persistent vomiting
- difficulty or pain in swallowing
- vomiting blood or passing blood in the stools
- anemia.

Imaging studies

If the indigestion should be investigated further, the doctor orders an endoscopic examination of the stomach. An endoscope is a slender tube-shaped instrument that allows the doctor to look at the lining of the patient's stomach. If the patient has indigestion of the esophagitis type or nonulcer type, the stomach lining will appear normal. If the patient has PUD, the doctor will be able to see breaks or ulcerated areas in the tissue. The physician may also order ultrasound imaging of the abdomen, or a radionuclide scan, to evaluate the motility of the stomach.

Laboratory tests

BLOOD TESTS. If the patient is over 45 years old, the doctor will have the patient's blood analyzed for a complete blood cell count, measurements of liver enzyme levels, electrolyte and serum **calcium** levels, and thyroid function.

TESTS FOR *HELICOBACTER PYLORI*. Doctors can test patients for the presence of *H. pylori* without having to take a tissue sample from the stomach. One of these noninvasive tests is a blood test and the other is a breath test.

Treatment

Nutritional supplements

Nutritionists or naturopaths may recommend the following to improve digestion:

- Avoid foods that may cause an upset stomach. These include spicy, fried, cured, or junk foods, cucumbers, onions, peppers, tomatoes, beans, carbonated beverages, or beverages containing caffeine.
- Eat lighter but more frequent meals.
- Avoid smoking.
- Adopt a high-fiber diet to improve regularity and treat digestive problems such as constipation, hemorrhoids, irritable bowel disease, and colon cancer. A high-fiber diet provides such additional health benefits as boosting the immune system function and preventing heart disease, cancer, and other diseases.
- Increase water intake. Proper hydration helps the digestive system work better.
- Improve poor digestive enzyme function with hydrochloric acid and pancreatic enzyme supplements such as lipase, amylase, and protease.
- Thicken a baby's food to help with reflux (add one tablespoon of dry rice cereal to each ounce of formula or breast milk). Hold babies upright after feedings rather than laying them down right away.

Herbal medicine

Practitioners of Chinese traditional herbal medicine might recommend medicines derived from peony (*Paeonia lactiflora*), **hibiscus** (*Hibiscus sabdariffa*), or hare's ear (*Bupleurum chinense*) to treat indigestion. Western herbalists are likely to prescribe **fennel** (*Foeniculum vulgare*), **lemon balm** (*Melissa officinalis*), or **peppermint** (*Mentha piperita*) to relieve stomach cramps and heartburn.

Homeopathy

Homeopaths tailor their remedies to the patient's overall personality profile as well as the specific symptoms. Depending on the patient's reaction to the indigestion and some of its likely causes, the homeopath might choose *Lycopodium*, *Carbo vegetalis*, ***Nux vomica***, or *Pulsatilla*.

Diet and stress management

Many patients benefit from the doctor's reassurance that they do not have a serious or fatal disorder. Cutting out alcoholic beverages and drinks containing **caffeine** often helps. The patient may also be asked to keep a record of food intake, daily schedule, and symptom severity. Food diaries sometimes reveal psychological or dietary factors that influence indigestion. Eating small frequent meals may also offer relief.

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Other treatments

Some alternative treatments are aimed at lowering the patient's stress level or changing attitudes and beliefs that contribute to indigestion. These therapies and practices include **Reiki**, **reflexology**, **hydrotherapy**, therapeutic massage, **yoga**, and **meditation**.

Allopathic treatment

Since most cases of indigestion are not caused by serious disorders, many doctors prefer to try medications and other treatment measures before ordering an endoscopy. However, in cases of individuals over 55 years of age, the physician may perform an endoscopy earlier in the course of treatment.

Many patients with acid reflux treat themselves with over-the-counter remedies. For nighttime GERD, a 2001 study recommended a dose of proton pump inhibitor before breakfast and another dose before dinner. Some medicines are also approved for use in infants and children with indigestion that does not resolve itself.

Medications

Patients with the esophagitis type of indigestion are often treated with H_2 antagonists, drugs that block the secretion of stomach acid. They include ranitidine (Zantac) and famotidine (Pepcid).

Patients with motility disorders may be given prokinetic drugs. Prokinetic medications such as metoclopramide (Reglan) and cisapride (Propulsid) speed up the emptying of the stomach and increase intestinal motility.

Removal of H. pylori

Antibiotic therapy may be given to wipe out *H. pylori* bacteria from the gastrointestinal tract.

Expected results

Most cases of mild indigestion do not need medical treatment. For patients who consult a doctor and are given an endoscopic examination, 5–15% are diagnosed with GERD and 15–25% with PUD. About 1% of patients who are endoscoped have stomach cancer. Most patients with functional dyspepsia do well on either H_2 antagonists or prokinetic drugs, depending on the cause of their indigestion.

Prevention

Indigestion can often be prevented by attention to one's diet, general stress level, and ways of managing stress. Specific preventive measures include:

- Stopping smoking.
- Cutting down on or eliminating alcohol, tea, or coffee.
- Avoiding foods that are highly spiced or loaded with fat.
- Eating slowly and keeping mealtimes relaxed.
- Practicing yoga or meditation.
- Not taking aspirin or other medications on an empty stomach.
- Keeping one's weight within normal limits.

KEY TERMS

Dyspepsia—Another name for indigestion.

Endoscope—A slender tubular instrument used to examine the inside of the stomach.

Gastroesophageal reflux disease (GERD)—A disorder of the lower end of the esophagus, caused by stomach acid flowing backward into the esophagus and irritating the tissues.

H_2 antagonist—A type of drug that relieves indigestion by reducing the production of stomach acid.

Heartburn—A popular term for an uncomfortable burning sensation in the stomach and lower esophagus, sometimes caused by the reflux of small amounts of stomach acid.

Helicobacter pylori—A gram-negative rod-shaped bacterium that lives in the tissues of the stomach and causes inflammation of the stomach lining.

Motility—The movement or capacity for movement of an organism or body organ. Indigestion is sometimes caused by abnormal patterns in the motility of the stomach.

Peptic ulcer disease (PUD)—A stomach disorder marked by corrosion of the stomach lining due to the acid in the digestive juices.

Prokinetic—A drug that works to speed up the emptying of the stomach and the motility of the intestines.

Reflux—The backward flow of a body fluid or secretion. Indigestion is sometimes caused by the reflux of stomach acid into the esophagus.

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ORGANIZATIONS
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Infant massage

Definition

Infant massage refers to massage therapy as specifically applied to infants. In most cases, oil or lotion is used as it would be on an adult subject by a trained and licensed massage therapist. Medical professionals caring for infants might also use massage techniques on infants born prematurely, on those with motor or gastrointestinal problems, or on those who have been exposed to cocaine in utero.

Origins

The practice of massaging infants dates back to ancient times, particularly in Asian and Pacific Island cultures; that is, massage was a component of the baby's regular bath routine among the Maoris and Hawaiians. Touch in these cultures is considered healthful both physically and spiritually. In the West, however, infant massage has received more attention in recent years in conjunction with the popularity of natural **childbirth** and midwife-assisted births. Dr. Frédéric Leboyer, a French physician who was one of the leaders of the natural childbirth movement, helped to popularize infant massage through his photojournalistic book on the Indian art of baby massage.

Infant massage. *(© Photo Researchers, Inc. Reproduced by permission.)*

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Infant massage was introduced formally into the United States in 1978 when Vimala Schneider McClure, a **yoga** practitioner who served in an orphanage in Northern India, developed a training program for instructors at the request of childbirth educators. An early research study by R. Rice in 1976 had showed that premature babies who were massaged surged ahead in weight gain and neurological development over those who were not massaged. From McClure's training in India, her knowledge of **Swedish massage** and reflexology, along with her knowledge of yoga postures that she had already adapted for babies, she became the foremost authority on infant massage. In 1986 she founded the International Association of Infant Massage (IAIM), which has 27 chapters worldwide as of 2000.

Benefits

Research from experiments conducted at the Touch Research Institutes at the University of Miami School of Medicine and Nova Southeastern University has been cited for the clinical benefits massage has on infants and children. Tiffany Field, Ph. D., director, noted that the research "... suggests that touch is as important to infants and children as eating and sleeping. Touch therapy triggers many physiological changes that help infants and children grow and develop. For example, massage can stimulate nerves in the brain which facilitate food absorption, resulting in faster weight gain. It also lowers level of **stress** hormones, resulting in improved immune function."

The benefits of infant massage include:

- relaxation
- relief from stress
- interaction with adults
- stimulation of the nervous system

The results of several studies showed that infant massage alleviates the stress that newborns experience as a result of the enormous change that birth brings about in their lives after the 6–9 months they have spent in the womb. Both premature infants and full-term babies need the relaxation that comes from massaging and moving their limbs and muscles. In infants with **colic**, massage provides the relief necessary to disperse **gas**, ease **muscle spasms**, tone the digestive system and help it work efficiently. Some techniques even help bring relief from teething and emotional stress. The stimulation an infant receives from massage can aid circulation, strengthen muscles, help digestion, and relieve **constipation**. The bonding that occurs with massage between a parent and child enhances the entire process of bonding that comes with contact through all of the senses, including touch, voice, and sight. It affords a physical experience of quality time between the parents and the child as well as with any significant others in a baby's life.

Description

Various techniques are used in infant massage, with the different strokes specific to a particular therapy. Special handling is used for treating a baby with gas and colic. Some of the strokes are known as "Indian milking," which is a gentle stroking of the child's legs; and the "twist and squeeze" **stroke**, a gentle squeeze of the muscles in the thigh and calf. The light "feather" strokes often employed in regular Swedish massage are applied at the end of a massage. The procedure is not unlike certain forms of adult massage, but with extra care taken for the fragility of the infant.

There are also specific Chinese techniques of pediatric massage, including massage of children with special needs. In China, these forms of massage can be given by medical professionals, but parents are often taught how to do the simpler forms for home treatment of their children.

Preparations

If lotions or oils are used, care is taken to ensure their safety on a baby's delicate skin. The most important consideration is to use vegetable oils rather than mineral oils, which can clog the pores in the skin. The oil that is used should be warmed in the caregiver's hands before applying it to the baby's skin. The environment in which the massage is given to an infant should be comfortably warm, and as calm and non-threatening as possible.

Precautions

Extreme caution is necessary when performing infant massage. Strokes are made with the greatest delicacy in order not to harm the infant in any way. Proper techniques are taught by licensed massage therapists ensuring that the infant is treated with appropriate physical touch. Anyone who is unfamiliar with handling a baby should receive appropriate instruction before beginning infant massage.

Side effects

No adverse side effects have been reported when infant massage is done properly after careful instruction, or by a licensed massage therapist who specializes in infant care.

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Research and general acceptance

In addition to the study already noted regarding touch therapy, a website devoted to infant massage lists research published as early as 1969, and cites hundreds of individual projects that have been conducted throughout the world focusing on infant massage. Many of the studies are related to the benefits of massage and touch for premature infants and others born with such risk factors as drug dependence. Conclusions regarding the benefits are overwhelmingly positive. The proliferation of therapists licensed in infant massage across the United States and worldwide indicates that infant massage is increasingly recognized as a legitimate health care treatment.

Training and certification

The International Association of Infant Massage (IAIM) has developed a basic course for licensing infant massage therapists. The pioneer in the field, Vimala McClure, began to prepare a course of instruction in the 1970s. The course is introduced in four-day sessions around the United States. Licensing is obtained by those who complete the course, pass a take-home examination, and complete a teaching practicum with five families over a three-month period. IAIM listed its course in 2000 as costing $550.00 if paid in full two weeks prior to training, and $595 after that. It includes a $100 nonrefundable deposit due one month before training. The cities where the basic course was offered in 2000 included Augusta, GA; Gaithersburg, MD; Chicago, IL; Boston, MA; Washington, DC; Charlottesville, VA; Minneapolis, MN; and Albuquerque, NM. In 2000, the International Institute of Infant Massage in Albuquerque also offered an Infant Massage Instructor Certification Course specifically geared to men, entitled "Men Teaching Fathers," and scheduled to last four days.

The licensing of massage therapists varies from state to state, as infant massage qualifies for consideration as medical treatment. Infant massage is becoming an increasingly popular discipline within the field. Numerous websites provide listings for infant massage specialists throughout the United States. The IAIM course is recognized as the official course for infant massage.

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International Institute of Infant Massage. 605 Bledsoe Rd. NW. Albuquerque, NM 87107. (505) 341-9381. Fax: (505) 341-9386. http://www.infantmassage.com.

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Jane Spehar

Infections

Definition

An infection is a condition in which viruses, bacteria, fungi, or parasites enter the body and cause a state of disease. These foreign invaders are called pathogens. They damage the body by adhering to or invading cells, altering the body's metabolism, releasing toxic substances, or causing allergic reactions. The body's immune system has a set series of responses to attempt to control infection; however, these reactions are not always successful. Chronic lower respiratory infection, **influenza** and **pneumonia** (combined), and sepsis (overwhelming systemic infection) were among the top ten causes of death in the United States in 2005.

Description

Pathogens are everywhere in the environment. They may enter the body through breathing, ingesting food or water, through sexual contact, open **wounds**, or contact

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with contaminated materials. The body has many natural barriers to infection. For example, harmless bacteria normally found on the skin, known as commensal bacteria, inhibit the growth of some pathogens. Sweat and oil gland secretions also protect the skin, and the skin itself offers a significant physical barrier to the entry of many pathogens. Mucus in the mouth and throat help physically trap inhaled pathogens before they can reach the lungs.

In addition to physical barriers, many of the body's secretions contain compounds that help destroy pathogens. The mucous membranes that line the airways and digestive system contain enzymes and chemicals that kill or disable pathogens. Commensal bacteria also live in the intestines and slow multiplication of pathogens just as they do on the skin. The digestive tract contains stomach acid, pancreatic enzymes, and other secretions that can kill certain pathogens. Peristalsis and the shedding of the lining of the intestinal tract also help to remove pathogens. The acid pH of the vagina is protective, as is the long urethra in males. The flushing action of urine as it is excreted also protects against infection. Nevertheless, some pathogens are able to enter the body and survive.

Most pathogens that succeed in entering the body are quickly killed before they have a chance to multiply. If, however, the body is unable to keep the pathogens in check, serious disease or death may occur. Acute infections develop suddenly, and they disappear when a person receives treatment or the body's immune system responds and destroys the pathogen. Chronic infections develop if the body has only limited control over a pathogen. In chronic infections, the body is never completely rid of the pathogen, but symptoms may disappear temporarily. Symptoms will then flare up again in response to physical or emotional **stress** or when the body is weakened by another illness. Sepsis is a serious, often fatal, condition in which a pathogen spreads throughout the body by way of the bloodstream. This type of infection affects the entire body and can cause major organ failure and death.

The body's immune system (mainly the spleen, thymus, lymph nodes, and white blood cells [WBCs]) does not stand by helplessly when pathogens begin to multiply. In response to chemicals released by cells damaged by pathogens, WBCs circulating in the blood migrate to the site of the infection. Several types of WBCs engulf pathogens and render them harmless. At the same time, body temperature often increases (a **fever**) in response to the chemical interferon that is released by damaged body cells. Low to moderate fever is a helpful part of the body's response to an infection because many pathogens do not thrive at higher-than-normal body temperatures. However, if body temperature climbs above 102°F (38.9°C), the individual may need treatment to lower it in order to avoid seizures, dehydration, and tissue damage.

WBCs are involved in another immune system response. This response takes a week or more to become effective. Pathogens are antigens. Antigens are foreign materials that stimulate the immune system to respond by making special proteins called antibodies. When a pathogen successfully establishes itself in the body, specialized WBCs respond by making antibodies. Antibodies interfere with the surface structure of the pathogen so that it cannot attach to or enter cells. Making enough antibodies to control a pathogen takes time, so the individual gets sicker before beginning to recover. Sometimes the pathogen multiplies so fast that the immune system cannot suppress it, and recovery does not occur. Once a person has made antibodies to a specific pathogen, the person is highly unlikely to be made ill by that pathogen again and is said to have immunity against that particular pathogen. Vaccination against diseases such as **measles** and polio is a way to create artificial immunity without the person having symptoms of the disease.

Causes and symptoms

Infections are caused by pathogens invading the body and multiplying. Headaches, muscle aches, fever, **chills**, and **fatigue** are common systemic symptoms of infections. These symptoms most often are due to inflammation and the response of the body to the release of interferon and other chemicals by damaged cells rather than by the pathogen. At the infection site, release of the chemical histamine brings an increased blood supply to that site and causes the blood capillaries become "leaky" so that WBCs can escape the capillaries and attack the pathogen. The infection site then becomes reddened, warm, and swollen. When the WBCs die and decay they form a thick fluid known as pus.

More specific symptoms of infection vary according to the site and type of the infection. Some of these symptoms include the following:

- Gastrointestinal system: diarrhea, vomiting, nausea, stomachaches, cramps, gas pains, and dehydration.
- Respiratory system: coughing, sneezing, sore throat, congestion, fever, bronchitis, and runny nose.
- Urinary system: increased frequency and urgency of urination; pain on urination; blood, pus, or other discharge in the urine; bad-smelling urine or discharge; and vaginal itching.

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- Skin: rashes, sores, itching, and blisters; redness, swelling, tenderness, and pain.
- Joints: local pain, stiffness, redness, and swelling.

Factors that increase the risk of acquiring an infection include chronic disease (e.g., **AIDS**), severe emotional stress, broken skin, changes in the pH of various body fluids, malnutrition, surgery, rupture of amniotic membranes in pregnant women, invasive medical or dental procedures, tissue injuries, decreased flow of body fluids (often a contributing factor in bladder infections) changes in peristalsis, decreased output of stomach acid, and suppressed immune function (e.g., in chemotherapy patients, people with AIDS, transplant patients). Many infections are contagious; that is, they can be passed from person to person. Contagion is especially typical in respiratory diseases, which can be transmitted through contact with the sputum and droplets produced by coughing or **sneezing**. Contact with infected waste products, open sores, skin eruptions, infected clothing and bedclothes, and sexual contact are other ways of spreading common pathogens.

In the first decade of the twenty-first century, people around the world are acutely aware of the threat of infection from bioterrorism. For example, Americans faced a scare from the deliberate distribution of anthrax spores through the United States postal system following the September 11, 2001 attacks. The U.S. Army Research Institute of Infections Diseases (USAMRIID) at Fort Detrick in Frederick, Maryland, researches ways to prevent and treat biological threats. As the threat of bioterrorism increased, USAMRIID provided training and diagnostic support to the FBI and state and local law enforcement, as well as researching medical methods for protecting military personnel from biological weapons.

The development of mutated (genetically changed as the result of natural selection) pathogens that are not killed by commonly used antibiotics is of increasing concern to healthcare workers. Methicillin-resistant *Staphylococcus aureus* (MRSA) is a strain of staphylococcal bacteria that is resistant to the antibiotic methicillin and other common antibiotics that normally control **staphylococcal infections**. Although this strain of staph has existed in hospitals for years, in the 1990s, MRSA began appearing in places other than hospitals. By 2007, two forms of MRSA were recognized, hospital-acquired MRSA (HA-MRSA) and community-acquired MRSA (CA-MRSA). Symptoms of a MRSA infection are similar to those of other staph infection symptoms, only MRSA is much more dangerous and has a much higher mortality rate because treatment with common antibiotics does not kill the bacterium. The incidence of drug-resistant **tuberculosis** was also rising as of 2008. Overuse of antibiotics accelerates the development of these drug-resistant pathogens.

Diagnosis

Many infections are minor and self-limiting. Superficial infections can generally be cured by keeping the area clean and antiseptic and applying warm, moist compresses to the affected area for 20 to 30 minutes three or four times a day. Some infections, however, are more serious and can lead to permanent impairment or death. For example, an untreated streptococcal infection (**strep throat**) can develop into **rheumatic fever**. Rheumatic fever damages the valves of the heart, although this damage may not show up for years. If an infection does not clear up within a few days, or if it gets worse, a healthcare provider should be consulted.

Infections usually are initially diagnosed by the patient's symptoms and a history of the illness or injury. A complete blood count (CBC) is a simple clinical test that can be used to diagnose or confirm an infection. Increases in the total WBC count usually indicate infection. Increases in specific types of white blood cells known as neutrophils, lymphocytes, and monocytes also point to an infection. An increase in eosinophils may be due to a parasitic infection. A blood chemistry panel may be done to determine whether significant chemical changes have been brought on by infection.

A serious illness may require further evaluation and diagnostic tests. Additional laboratory tests can be performed using blood, feces, or samples of the infected tissue. Laboratory tests, for example, can determine what type of bacterium is causing an infection and which antibiotics will kill it. Ultrasound, computed tomography (CT) scans, and magnetic resonance imaging (MRI) also may be used. In some cases, a tissue sample (biopsy) is taken from the affected site for microbial culture tests and microscopic examination.

Treatment

Herbal therapy

Herbs that may help the body overcome or withstand infection include the following:

- Garlic (*Allium sativum*). This herb is believed to have antibacterial properties. Herbalists recommend consuming three garlic cloves or three garlic oil capsules a day, starting when symptoms of infection first appear.

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- Cleavers (*Galium aparine*). This anti-inflammatory herb is believed to support the lymphatic system. It may be taken internally to help heal staph abscesses and reduce swelling of the lymph nodes. A cleavers compress can also be applied directly to a skin infection.
- Goldenseal (*Hydrastis canadensis*). Another herb believed to fight infection and reduce inflammation, goldenseal may be taken internally when symptoms of infection first appear. Making a paste of water and powdered goldenseal root and applying it directly to the affected area can treat skin infections. The preparation should be covered with a clean bandage and left in place overnight.
- Echinacea (*Echinacea* spp.). Taken internally, this herb is believed to have antibiotic properties and is also thought to strengthen the immune system.
- Thyme (*Thymus vulgaris*), lavender (*Lavandula officinalis*), or bergamot (*Citrus bergamot*) oils. These oils are believed to have antibacterial properties and may help to prevent the scarring that may result from skin infections. A few drops of these oils are added to water and then a compress soaked in the water is applied to the affected area.
- Tea tree oil (*Melaleuca* spp., or ylang ylang). Another infection-fighting herb, this oil can be applied directly to a boil or other skin infection.
- Reishi (*Ganoderma lucidum*), shiitake (*Lentinus edodes*), and maitake (*Grifola frondosa*) mushrooms are known for their ability to strengthen the immune system and their antimicrobial properties.

Dietary modifications

A healthful balanced diet and lifestyle are important supports of the immune function. Regular supplementation with **vitamin C**, **vitamin A** or beta-carotene, **zinc**, and **bioflavonoids** is also thought to boost the immune response.

Sugary foods, including honey, may depress the immune system. Very high levels of fat in the diet may also interfere, as well as causing other negative health effects. Alcohol decreases the functioning of the immune system. All of these substances should be avoided during the course of an infection. People should increase their intake of fluids, including soups, teas, diluted fruit and vegetable juices, and pure water when fighting an infection, especially if they have a fever.

Aromatherapy

Aromatherapy may be a useful supportive measure in infectious conditions. An essential oil of cedarwood (*Cedrus atlantica*) is recommended in **fungal infections**. **Essential oils** of tea tree (*Melaleuca alternifolia*) and patchouli are also useful. Essential oils are very concentrated and toxic to the liver and kidneys; they should be used only in very small doses (drops) under the supervision of an aromatherapist.

Acupuncture and yoga

Acupuncture may be helpful in stimulating the immune system and drawing heat away from the infected area. It reduces the effects of stress, improves circulation, and increases the production of red blood cells (RBCs) and WBCs. **Yoga** stimulates the immune system and promotes **relaxation**.

Hydrotherapy

Constitutional **hydrotherapy** is the use of applications of hot water alternated with cold. It is effective in respiratory infections and may stimulate the immune system. For proper administration of hydrotherapy, a naturopath or other healthcare provider familiar with its techniques should be consulted.

Allopathic treatment

Symptoms arising from minor infections are often relieved by over-the-counter medications. A high fever or joint **pain** may be a sign of infection spreading throughout the body. A physician should be contacted promptly. Infections from **bites** and puncture wounds should also receive medical attention and they may require a **tetanus** shot.

Serious infections are treated with antibiotics. Some antibiotics are effective against certain parasitic and fungal infections as well as bacteria. Antibiotics are ineffective against viral infections, and there is a trend away from giving them unless a bacterial infection has been clinically documented. The elderly or seriously ill may receive antibiotics when infected with a virus to prevent a secondary bacterial infection, which often occurs because of the weakened state brought on by the virus. In the case of viral infections, antiviral drugs may reduce symptoms. These drugs tend to be expensive and their usefulness is somewhat limited by the timing with which they must be administered.

Antifungal drugs are often applied directly to surface fungal infections such as athlete's foot. They also may be taken orally or injected. Fungal infections tend to be stubborn and often require several weeks of treatment and repeated courses of the drug.

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Expected results

Most minor infections resolve within a week. Chronic infections may last for years. Serious infections need to be attended by a physician, as tissue and organ damage and death may result from failure to treat. **Anemia** may result from severe infections, since RBCs or their production may be affected.

Prevention

Various vaccines are available to prevent some specific infections. Vaccines are made from deactivated parts of viruses or bacteria that stimulate the body to produce antibodies against the pathogen without producing symptoms of the disease. They produce future immunity to infection from those pathogens that last anywhere from a season (influenza) to a lifetime (smallpox). Vaccinations for **mumps**, measles, chicken pox, tetanus, **hepatitis**, diphtheria, **whooping cough**, pneumonia, and **meningitis** are widely available in the United States. They are routinely given to infants and children to provide immunity from these diseases. Most states require certain vaccinations before children may attend public school (although exceptions can be made on religious and other grounds), and many universities require certain re-vaccinations before matriculation. Individuals in the military are also vaccinated or re-vaccinated against many diseases. Individuals traveling to developing countries often require non-routine vaccination against diseases uncommon on nonexistent in the United States.

Good hygienic practices help slow the spread of infection. These include keeping the body clean, as well as keeping food, utensils, and areas of preparation clean and free from contamination. The mantra for preventing food-borne infection is: "Keep cold food cold. Keep hot food hot." Warm or room-temperature food is a breeding ground for food-borne pathogens. Meat, seafood, and dairy products should be properly refrigerated until used. Meat, seafood, and eggs should be completely cooked to an internal temperature that kills food-borne pathogens. Breaks in the skin should be cleaned, disinfected, and covered. Direct contact with people known or suspected to have infections should be limited, depending on the nature of the disease. Thorough hand washing is one of the simplest and most cost-effective ways to prevent the spread of infection.

A positive mental outlook also is important in maintaining a healthy immune system, as are getting adequate amounts of sleep, relaxation, **exercise**, and stress reduction. A diet high in fresh fruits, fresh vegetables, and whole grains and low in saturated (animal) fats promotes general good health. Good lifestyle habits, such as avoiding **smoking**, recreational drugs, and limiting alcohol intake should be cultivated.

KEY TERMS

Allergen—Any substance, usually a protein, that induces an allergic reaction in a particular individual.

Antibiotic—An agent able to kill or interfere with the development of bacteria and other micro-organisms.

Antibody—A protein produced by the immune system to fight infection or rid the body of foreign material. The foreign material that stimulates the production of antibodies is called an antigen. Specific antibodies are produced in response to each different antigen and can only inactivate that particular antigen.

Commensal bacteria—Bacteria that live in or on the human body and are in an often beneficial relationship with the human host. For example, some bacteria in the digestive tract produce needed B vitamins.

Inflammation—The body's response to tissue damage; includes hotness, swelling, redness, and pain in the affected part.

Lymph nodes—Small, bean-shaped masses of tissue scattered along the lymphatic system that act as filters and immune monitors, removing fluids, bacteria, or cancer cells that travel through the lymph system.

Pathogens—Micro-organisms capable of causing disease.

Peristalsis—The smooth muscle contractions that move food, bile, and urine through their respective passageways.

pH—A comparative measure of the acidity or alkalinity of a solution.

Vaccine—Any preparation introduced into the body to prevent a disease by stimulating antibodies against it.

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ORGANIZATIONS

Alternative Medicine Foundation, PO Box 60016, Potomac, MD, 20859, (301) 340-1960, http://www.amfoundation.org.

American Association of Oriental Medicine, PO Box 162340, Sacramento, CA, 95816, (866) 455-7999, (914) 443-4770, http://www.aaaomonline.org.

American Holistic Medical Association, PO Box 2016, Edmonds, WA, 98020, (425) 967-0737, http://www.holisticmedicin.org.

Centers for Disease Control and Prevention (CDC), 1600 Clifton Road, Atlanta, GA, 30333, (800) 311-3435, (404) 639-3534, http://www.cdc.gov.

National Center for Homeopathy, 801 N. Fairfax St., Suite 306, Alexandria, VA, 22314, (703) 548-7790, http://www.homeopathic.org.

National Institute of Ayurvedic Medicine, 375 Fifth Ave., Fifth Floor, New York, NY, 10016, (212) 685-8600, http://niam.com/corp-web/index.htm.

Patience Paradox
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Infectious mononucleosis *see* **Mononucleosis**

Infertility

Definition

Infertility is the failure of a couple to conceive a **pregnancy** after trying to do so for at least one full year. In primary infertility, pregnancy has never occurred. In secondary infertility, one or both members of the couple have previously conceived but are unable to conceive again after a full year of trying.

Description

Approximately 20% of couples struggle with infertility at any given time. Infertility increased as a problem after 1975. Some studies blamed this increase on social phenomena, including the tendency for marriage and starting a family to occur at a later age. For women, fertility decreases with increasing age:

- Infertility in married women ages 16 to 20: 4.5%.
- Infertility in married women ages 35 to 40: 31.8%.
- Infertility in married women over the age of 40: 70%.

Individuals may have multiple sexual partners before they marry and try to have children. The increase in numbers of sexual partners has led to an increase in sexually transmitted diseases. Scarring from these **infections**, especially from **pelvic inflammatory disease** (PID, an infection of the female reproductive organs) seems to be partially responsible for the increase in infertility. Furthermore, use of some forms of the contraceptive called the intrauterine device (IUD) has contributed to an increased rate of pelvic inflammatory disease, with subsequent scarring. As of 2008 IUDs were not a common form of birth control in the United States, but they were widely used in Europe. In the late twentieth century, **copper** IUDs were linked to increased tubal infertility. Research subsequently strongly suggested that infection from the sexually transmitted disease **chlamydia** was likely the true cause.

To understand issues of infertility, it is first necessary to understand the basics of human reproduction. Fertilization occurs when a sperm from the male merges with an egg (ovum) from the female, creating a zygote that contains genetic material (DNA) from both the father and the mother. If pregnancy is then established, the zygote will develop into an embryo, then a fetus, and ultimately, if all goes well, a baby will be born in about nine months.

Sperm are small cells that carry the father's genetic material. The sperm are mixed into fluid called semen, which is discharged from the penis during sexual intercourse. The whip-like tail of the sperm allows the sperm to swim up the female reproductive tract, in search of an egg.

The ovum is the cell that carries the mother's genetic material. Once a month, a single mature ovum is produced and leaves the ovary in a process called ovulation. This ovum enters a tube leading to the uterus (the fallopian tube) where fertilization occurs.

When fertilization occurs, the resulting cell (which now contains genetic material from both the mother and the father) is called the zygote. This single cell will divide into multiple cells and the resulting cluster of cells (called a blastocyst) moves into the womb (uterus). The uterine lining (endometrium) has been stimulated by female hormones and grows thicker to prepare it to receive a blastocyst. If the blastocyst successfully attaches itself to the wall of the uterus, pregnancy has been achieved.

Causes and symptoms

Unlike most medical problems, infertility is an issue requiring the careful evaluation of two separate

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individuals, as well as an evaluation of their interactions with each other. In about 3 to 4% of couples, no cause for infertility is discovered. About 40% of the time, infertility is due to a problem with the male; about 40% of the time, infertility is due to the female; and the remainder of the time, there are fertility problems with both the male and the female.

The main factors involved in causing infertility are:

- male sperm problems: 35%
- ovulation problems: 20%
- tubal problems: 20%
- endometriosis: 10%
- cervical factors: 5%

Male factors

Male infertility can be caused by a number of different characteristics of the sperm. To check for these characteristics, a sample of semen is obtained and examined under the microscope (semen analysis). Four basic characteristics are evaluated:

- Sperm count is the number of sperm present in a semen sample. The normal number of sperm present in just 1 ml of semen is over 20 million. A man with only 5 to 20 million sperm is considered subfertile and a man with less than 5 million sperm is considered infertile.
- Sperm are also examined to see how well they swim (sperm motility) and to be sure that most have normal structure.
- Not all sperm within a specimen of semen are perfectly normal. Some may be immature, and some may have abnormalities of the head or tail. A normal semen sample contains no more than 25% abnormal forms of sperm.
- Volume of the semen sample is important. An abnormal amount of semen could affect the ability of the sperm to successfully fertilize an ovum.

Any number of conditions result in abnormal findings in the semen analysis. Men can be born with testicles that have not descended properly from the abdominal cavity (where testicles develop originally) into the scrotal sac, or they may be born with only one instead of the normal two testicles. Testicle size can be smaller than normal. Past infection (including **mumps**) can affect testicular function, as can a past injury. The presence of abnormally large veins (varicocele) in the testicles can increase testicular temperature, which decreases sperm count. History of having been exposed to various toxins, drug use, excess alcohol use, use of anabolic steroids, certain medications, diabetes, thyroid problems, or other endocrine disturbances can have direct effects on the formation of sperm (spermatogenesis). Certain organic solvents that men encounter in the workplace are also a possible cause of low sperm count. These solvents are most likely encountered by professional printers, painters, and decorators. Problems with the male anatomy also can cause sperm to be ejaculated not out of the penis, but into the bladder, and scarring from past infections can interfere with ejaculation.

Researchers continue to try and determine reasons for male infertility. They have reported that a certain protein lacking in the sperm could prevent formation of the structure on the head of the sperm that contains enzymes that help penetrate the egg, allowing conception. The finding may lead to further study of the molecular/chemical basis of male fertility.

Ovulatory problems

Infertility in women can occur for a variety of reasons. The first step in diagnosing ovulatory problems is to make sure that an ovum is being produced each month. A woman's morning body temperature is slightly higher around the time of ovulation. A woman can measure and record her temperature daily, and a chart can be drawn to show whether ovulation has occurred. Luteinizing hormone (LH) is released just before ovulation. A simple urine test can be done to check if LH has been released around the time that ovulation is expected.

Pelvic adhesions and endometriosis

Pelvic adhesions cause infertility by blocking the fallopian tubes and preventing the sperm from reaching the egg. Pelvic adhesions are fibrous scars. These scars can be the result of past infections, such as PID, or infections following abortions or prior births. Previous abdominal surgeries can also cause scarring.

A hysterosalpingogram (HSG) can show if the fallopian tubes are blocked. This is an x-ray exam that tests whether dye material can travel through the patient's fallopian tubes. Scarring also can be diagnosed by examining the pelvic area through the use of a laparoscope that is inserted into the abdomen through a tiny incision made near the navel.

Endometriosis is the abnormal location of uterine tissue outside the uterus. When uterine tissue is planted elsewhere in the pelvis, it still bleeds on a monthly basis with the start of the normal menstrual period, which leads to irritation within the pelvis around the site of this abnormal tissue and bleeding

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and may cause scarring. Endometriosis may lead to pelvic adhesions.

Cervical factors

The cervix is the opening between the vagina and the uterus through which the sperm must pass. Mucus produced by the cervix helps to transport the sperm into the uterus. Injury to the cervix or scarring of the cervix after surgery or infection can result in a smaller than normal cervical opening, making it difficult for the sperm to enter. Injury or infection can also decrease the number of glands in the cervix, leading to a smaller amount of cervical mucus. In other situations, the mucus produced is the wrong consistency (perhaps too thick) to allow sperm to travel through. In addition, some women produce antibodies (immune cells) that are specifically directed to identify sperm as foreign invaders and to kill them.

Cervical mucus can be examined under a microscope to diagnose whether cervical factors are contributing to infertility. The interaction of a live sperm sample from the male partner and a sample of cervical mucus from the female partner can also be examined. This procedure is called a post-coital test.

Treatment

Conventional treatment for infertility usually involves invasive, expensive procedures. There are many alternative treatments available that can increase the chance of conception. Some have been proven effective in clinical studies.

General measures to increase fertility include monitoring ovulation and timing intercourse (optimal chance for conception is in the days prior to and including the day of ovulation), and quitting **smoking**, excessive drinking, and drug taking. To improve sperm quality, men can wear boxer shorts instead of briefs.

Both men and women can increase fertility by eating a well-balanced diet. Good food choices include legumes (especially soy), dark-colored vegetables, fruits, seeds, nuts, and sufficient good quality protein, including meat, fish, and eggs. Some people believe that refined sugar, processed cheeses, foods made with white flour, and chemical preservatives should be avoided. Adequate sleep is also important.

Supplements

Dietary supplements that may enhance fertility include the following:

- Multivitamins can help treat infertility in women.
- Vitamin E has antioxidant activity that prevents reproductive damage in men and women. It can increase sperm count and motility in men and balance hormones in women.
- Vitamin C has antioxidant activity that prevents reproductive damage in men and women. Also, a study found that vitamin C supplementation led to improved sperm count and decreased sperm clumping in infertile men.
- Folic acid (with a multivitamin) improved fertility in a study of infertile women.
- Zinc deficiency is often associated with low sperm count. Studies have found that zinc supplementation can improve male fertility.
- Arginine supplementation led to major increases in sperm count and motility in a study of infertile men.
- Selenium has antioxidant activity. Selenium supplementation led to increased sperm count and motility and decreased number of abnormal sperm in a study of infertile men.
- Beta-carotene supplementation can increase sperm count and motility.
- B vitamins (B_2, B_6, and B_{12}) are important for optimal fertility.

Herbals and Chinese medicine

The following may be taken by women to treat infertility:

- Dong quai (*Angelica sinensis*) has been used to regulate menstrual cycles and for infertility.
- Licorice helps to balance levels of estrogen and testosterone and is used for infertility.
- Red clover (*Trifolium pratense*) has a beneficial effect on the uterus, can calm the nervous system, and can balance hormone levels.
- Nettle (*Urtica dioica*) supports the uterus and hormonal system.
- Raspberry leaf strengthens the mucous lining of the uterus.
- Chasteberry (*Vitex agnus-castus*) balances hormone production.
- Ladies mantle (*Alchemilla vulgaris*) balances hormone production.
- Shatavari (*Asparagus racemosus*) is an Ayurvedic remedy for infertility and works by balancing hormones.
- *Rehmannia* is an Ayurvedic remedy for infertility.
- Myrrh (*Commiphora myrrha*) is an Ayurvedic remedy for infertility.

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- False unicorn (*Chamaelirium luteum*) balances hormone levels.
- Pomegranate essence balances the reproductive system.

The following may be taken by men to treat infertility:

- Ginseng may increase the formation of sperm, testosterone levels, and sexual activity.
- Pygeum may help infertile men who have a reduced secretion of semen.
- Pine bark extract improves sperm shape.
- Chasteberry (*Vitex agnus-castus*) balances hormone production.
- Shatavari (*Asparagus racemosus*) is an Ayurvedic remedy for infertility and works by balancing hormones; may increase sperm production.
- Saw palmetto (*Serenoa serrulata*) increases the production of testosterone and strengthens the reproductive system.
- Ashwaganda (*Withania omnifera*) is an Ayurvedic remedy that improves the quality of semen and sperm count.
- Chinese herbals must be specifically designed and used to treat infertility in males.

Other treatments

A variety of other alternative treatments may be used for infertility:

- stress reduction
- cognitive behavior therapy
- visualization
- homeopathy
- reflexology
- essential oils
- acupuncture

Allopathic treatment

The first step in the treatment of infertility is performing thorough physical exams and testing of both partners in the hope of finding the source of infertility. For the woman this involves blood testing and ultrasound examinations at specific days during the menstrual cycle. This may include an endometrial biopsy in which a sample of the lining of the uterus is taken and examined. Hysteroscopy, in which a special camera examines the inside of the uterus, may be performed.

Pelvic adhesions can be treated during laparoscopy. The adhesions are cut using special instruments. Endometriosis can be treated with certain medications but may also require surgery to repair any obstruction caused by adhesions.

Treatment of cervical factors includes antibiotics in the case of an infection, steroids to decrease production of anti-sperm antibodies, and artificial insemination techniques to completely bypass the cervical mucus.

Treatment of ovulatory problems depends on the cause. If a thyroid or pituitary gland problem is responsible, simply treating that problem can restore fertility. Medications that stimulate ovulation are clomiphene citrate (Clomid) that is taken by mouth and follicle stimulating hormone (Pergonal, Fertinex, and Follistim) that is given by injection. These drugs increase the risk of multiple births (e.g., twins, triplets) and may cause side effects.

Treatment of male infertility includes addressing known reversible factors first; for example, discontinuing any medication known to have an effect on spermatogenesis or ejaculation, as well as decreasing alcohol intake, and treating thyroid or other endocrine disease. Varicoceles can be treated surgically. Testosterone in low doses can improve sperm motility.

Other treatments of male infertility include collecting semen samples from multiple ejaculations, pooling them, and depositing them into the female's uterus during ovulation. When the male partner's sperm is proven to be absolutely unable to produce pregnancy, donor sperm may be used. Depositing the male partner's sperm or donor sperm by mechanical means into the female is called artificial insemination.

Assisted reproductive techniques include in vitro fertilization (IVF), gamete intrafallopian transfer (GIFT), and zygote intrafallopian tube transfer (ZIFT). These are usually used after other techniques to treat infertility (surgery, medications, and/or insemination) have failed.

IVF involves the use of drugs to induce the simultaneous production of many eggs from the ovaries, which are retrieved surgically or via ultrasound-guided needle aspiration through the vaginal wall. The ova and sperm are combined in a laboratory, where several of the ova may be fertilized. Cell division is allowed to take place up to the pre-embryo stage. While this takes place, the female may be given progesterone to ensure that her uterus is ready for implantation. Two or more pre-embryos are transferred to the female's uterus.

Success rates of IVF were rather low as of 2008. The national average success rate of IVF is approximately

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KEY TERMS

Blastocyst—A cluster of cells representing multiple cell divisions that have occurred in the fallopian tube after successful fertilization of an ovum by a sperm. This is the developmental form that must enter the uterus and implant to achieve pregnancy.

Cervix—The opening from the vagina leading into the uterus.

Embryo—The stage of development of a baby between the second and eighth weeks after conception.

Endometrium—The lining of the uterus.

Fallopian tube—The tube leading from the ovary into the uterus.

Ovary—The female organ in which eggs (ova) are stored and mature.

Ovum—The reproductive cell of the female that contains genetic information and participates in the act of fertilization; also popularly called the egg.

Semen—The fluid that contains sperm, which is ejaculated by the male.

Sperm—The reproductive cell of the male that contains genetic information and participates in the act of fertilization of an ovum.

Spermatogenesis—The process by which sperm develop to become mature sperm, capable of fertilizing an ovum.

Zygote—The result of the sperm successfully fertilizing the ovum. The zygote is a single cell that contains the genetic material of both the mother and the father.

27%, but some centers have higher pregnancy rates. Because most IVF procedures put more than one embryo into the uterus, the chance for a multiple birth (twins or more) is greatly increased.

GIFT involves retrieval of both multiple ova and semen, and the mechanical placement of both within the female's fallopian tubes, where fertilization may occur. ZIFT involves the same retrieval of ova and semen, and fertilization and growth in the laboratory up to the zygote stage, at which point the zygotes are placed in the fallopian tubes. Both GIFT and ZIFT have higher success rates than IVF. These procedures can be expensive. Insurance coverage for all assisted reproductive techniques varies widely.

Expected results

In general, about half of the couples who undergo a complete evaluation of infertility followed by treatment will ultimately have a successful pregnancy. About 5% of those couples who choose to not undergo evaluation or treatment will go on to conceive after a year or more.

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ORGANIZATIONS

Alternative Medicine Foundation, PO Box 60016, Potomac, MD, 20859, (301) 340-1960, http://www.amfoundation.org.

American Association of Oriental Medicine, PO Box 162340, Sacramento, CA, 95816, (866) 455-7999, (914) 443-4770, http://www.aaaomonline.org.

American Holistic Medical Association, PO Box 2016, Edmonds, WA, 98020, (425) 967-0737, http://www.holisticmedicine.org.

American Society for Reproductive Medicine, 1209 Montgomery Highway, Birmingham, AL, 35216-2809, (205) 978-5000, http://www.asrm.com.

International Center for Infertility Information Dissemination, PO Box 6836, Arlington, VA, 22206, (703) 379-9178, http://www.asrm.org.

National Institute of Ayurvedic Medicine, 375 Fifth Ave., Fifth Floor, New York, NY, 10016, (212) 685-8600, http://niam.com/corp-web/index.htm.

RESOLVE, 8405 Greensboro Drive, Suite 800, McLean, VA, 22102-5120, (703) 556-7172, http://www.resolve.org.

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Inflammatory bowel disease

Definition

Inflammatory bowel disease (IBD) is an inflammation of the intestines, especially the colon and rectum. It occurs primarily in two forms, ulcerative **colitis** and Crohn's disease. The disease is characterized by swelling, ulcerations, and loss of function of the intestines.

Description

The primary problem in IBD is inflammation, as the name suggests. Inflammation is a process that often occurs to fight off foreign invaders in the body, including viruses, bacteria, and fungi. In response to such organisms, the body's immune system begins to produce a variety of cells and chemicals intended to stop the invasion. These immune cells and chemicals, however, also have direct effects on the body's tissues, resulting in heat, redness, swelling, and loss of function. No one knows what starts the cycle of inflammation in IBD, but the result is a swollen, boggy intestine.

In ulcerative colitis, the inflammation affects the lining of the rectum and large intestine. It is thought that the inflammation typically begins in the last segment of large intestine, which empties into the rectum (sigmoid colon). This inflammation may spread through the entire large intestine, but only rarely does it affect the very last section of the small intestine (ileum). The rest of the small intestine remains normal.

Crohn's disease is a form of IBD that affects both the small and large intestines. The inflammation of ulcerative colitis occurs only in the lining of the intestine, unlike Crohn's disease which affects all of the layers of the intestinal wall. As the inflammation continues, the tissue of the intestine begins to slough off, leaving pits (ulcerations) that often become infected.

IBD can occur in all age groups, with the most common age of diagnosis being between 15 and 35 years of age. Men and women are affected equally. Whites are more frequently affected than other racial groups, and people of Jewish origin have three to six times greater likelihood of suffering from IBD. IBD is familial; an IBD patient has a 20% chance of having other relatives who also have the disease.

Causes and symptoms

No specific cause of IBD has been identified. Although no organism (virus, bacteria, or fungi) has been found to set off the cycle of inflammation, some researchers continue to suspect that an organism is responsible. Other researchers have concentrated on identifying some change in the cells of the colon that cause the body's immune system to accidentally begin treating those cells as foreign. Additional evidence for a disorder of the immune system includes the high number of other immune disorders that frequently accompany IBD. The condition has also been linked to physical, mental, and emotional **stress**.

The first symptoms of IBD are abdominal cramping and **pain**, a sensation of urgent need to have a bowel movement (defecate), and blood and pus in the stools. Some patients experience **diarrhea**, **fever**, and weight loss. If the diarrhea continues, signs of severe fluid loss (dehydration) begin to appear, including low blood pressure, fast heart rate, and **dizziness**.

Severe complications of IBD include perforation of the intestine, toxic dilation (enlargement) of the colon, and the development of colon **cancer**. Intestinal perforation occurs when long-standing inflammation and ulceration of the intestine weakens the wall to such an extent that a hole occurs. This complication is life-threatening because the contents of the intestine (which contain a large number of bacteria) spill into the abdomen. The presence of bacteria in the abdomen can result in a massive infection called peritonitis.

Toxic dilation of the colon is thought to occur because the intestinal inflammation interferes with the normal function of the muscles of the intestine. This condition allows the intestine to become lax, and its diameter begins to increase. The enlarged diameter thins the walls further, increasing the risk of perforation and peritonitis. When the diameter of the intestine is quite large, and infection is present, the condition is referred to as toxic megacolon.

Patients with IBD have a significant risk of developing colon cancer. This risk seems to begin around 10 years after diagnosis. The overall risk of developing cancer seems to be greatest for those patients with the largest extent of intestine involved. The risk becomes statistically greater every year:

- At 10 years, the risk of cancer is about 0.5–1%.
- At 15 years, the risk of cancer is about 12%.
- At 20 years, the risk of cancer is about 23%.
- At 24 years, the risk of cancer is about 42%.

Patients with IBD also have a high chance of experiencing other disorders, including inflammation of the joints (arthritis); inflammation of the vertebrae (spondylitis); ulcers in the mouth and on the skin; the development of painful, red bumps on the skin;

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inflammation of several areas of the eye; and various disorders of the liver and gallbladder.

Diagnosis

IBD is first suspected based on the symptoms that a patient is experiencing. Examination of the stool usually reveals the presence of blood and pus (white blood cells). Blood tests may show an increase in the number of white blood cells, which is an indication of inflammation occurring somewhere in the body. The blood test may also reveal **anemia**, particularly when a great deal of blood has been lost in the stool.

The most important allopathic method of diagnosis is endoscopy, during which a doctor passes a flexible tube with a tiny, fiber-optic camera device through the rectum and into the colon. The doctor can then examine the lining of the intestine for signs of inflammation and ulceration. A tiny sample (biopsy) of the intestine is removed through the endoscope, which is examined under a microscope for evidence of IBD. X-ray examination is helpful to determine the amount of affected intestine. However, x-ray examinations requiring the use of barium compound should be delayed until treatment has begun. The barium compound used is a chalky solution that the patient drinks or is administered through the rectum and into the intestine (enema). The presence of barium in the intestine makes possible a more distinct picture on x-ray films.

Treatment

Treatment for IBD targets the underlying inflammation, as well as the problems occurring due to continued diarrhea and blood loss. The use of alternative medicines in the treatment of IBD is common. IBD sufferers have used a variety of treatments; however, few controlled studies of their effectiveness have been performed.

Chamomile tea is used to treat IBD. Chamomile is known to have anti-inflammatory, antispasmodic, and antibacterial properties. The patient should steep dried flowers for 10 to 15 minutes and drink three to four cups daily. Chamomile can cause allergic reactions to those who are allergic to other daisies. Other antispasmodics include **valerian**, wild yam, and **cramp bark**.

There is some preliminary evidence that alteration of the kinds of bacteria in the intestine prevents or controls colitis. Intestinal bacteria can be manipulated through use of **probiotics** or prebiotics. Probiotics refers to treatment with beneficial microbes either by ingestion or through a suppository. Prebiotics refers to dietary changes which favor the overgrowth of beneficial microbes. Preliminary animal and human studies have shown that *Lactobacilli* and related bacteria can control colitis and prolong remission. Ingestion of the nondigestable carbohydrates inulin or lactulose as prebiotics stimulates growth of these beneficial bacteria.

In a related treatment, preliminary evidence suggests that ingestion of parasitic worm eggs eases the symptoms of IBD. Within two to three weeks, five out of the six IBD patients who ingested the eggs went into complete remission which lasted one month. The tiny, harmless **worms** cannot reproduce in humans and are excreted within a few months.

Ingestion of enteric coated **fish oil** capsules may reduce the IBD relapse rate. A small study found that patients taking fish oil supplements had a lower relapse rate (59%) than those on placebo (90%).

A number of studies have attempted to assess the efficacy of various complementary and alternative approaches to the treatment of IBD. In many cases, these studies have not been repeated or confirmed, although they may suggest future lines of research. In one study, 72 percent of ulcerative colitis patients taking a Kui Jie Qing enema (alum, Halloysite, Calamine, *Indigo naturalis*) and plum-blossom tongue-pointing pills daily were considered cured as compared to 5% of those who were taking anti-inflammatory drugs. Fifty-three percent of ulcerative colitis patients taking Jian Pi Ling tablet and root of *Sophorae flavescentis* plus the flower of *sophora* enema were considered cured as compared to 28% of those taking sulfasalazine and dexamethasone and 19% of those taking a placebo tablet and the enema. There are many other Chinese herbs that are useful in treating diarrhea and mucus in the bowel. Sometimes these are effective when drugs are not.

Forty-five percent of ulcerative colitis patients on an enzyme potentiated hyposensitization protocol (B-glucuronidase enzyme and 1,3-cyclohexanediol with egg, milk, wheat, potato, and yeast) improved as compared to 6% of those on placebo.

Nutritionists often recommend changes in the diet for patients with inflammatory bowel disease. Food **allergies** and certain kinds of food are linked with the increased incidence of the disease. Eliminating diary and wheat products, common allergens, often alleviates symptoms. The incidence of Crohn's disease has increased in areas in which people consume a diet high in refined sugars and carbohydrates and saturated fats and low in dietary fiber. Elimination **diets** or those restricted in refined foods have sometimes proved successful in the alleviation of inflammatory bowel disease.

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Dietary supplements are generally beneficial in the treatment of digestive disorders. Some typical recommendations are:

- vitamin C: 4000 mg daily
- vitamin B_6: 250 mg daily
- Magnesium (aspartate): 400 mg daily
- vitamin E: 800 IU daily
- glutamine: 3000 mg daily, taken between meals
- garlic, deodorized: 2000 mg daily
- deglycyrrhizinated licorice: chew as needed.

Other treatments for IBD include **acupuncture**, macrobiotics, **cat's claw** (*Uncaria tomentosa*), **slippery elm**, **acupressure**, **biofeedback**, **relaxation** techniques, and **hypnotherapy**. A 2006 review of complementary and alternative methods for treating IBD by researchers at University College London Hospitals found suggestive evidence for the efficacy of some methods, but it concluded that further clinical trials were necessary to confirm their value. The reviewers also pointed out a number of safety problems involved in the use of herbal and other treatments and called for enhanced legislation that would further protect consumers from the risks posed by some remedies.

Allopathic treatment

Inflammation is often treated with an immune-suppressive drug called sulfasalazine. Because of poor absorption, sulfasalazine stays primarily within the intestine, where it is broken down into its two components: an antibiotic and an anti-inflammatory. It is believed to be primarily the anti-inflammatory component, salicylic acid, that is active in treating IBD. For patients who do not respond to sulfasalazine, steroid medications (such as prednisone) are the next choice.

Depending on the degree of blood loss, a patient with IBD may require blood transfusions and fluid replacement through a needle in the vein (intravenous or IV). Medications that can slow diarrhea must be used with great care because they may actually cause the development of toxic megacolon.

Patients with toxic megacolon require close monitoring and care in the hospital. They usually are given steroid medications through an IV and may be put on antibiotics. If these measures do not improve the situation, they may have to undergo surgery to remove the colon. This procedure reduces the risk of death after perforation of toxic megacolon, which is greater than 50%.

A patient with proven cancer of the colon, or even a patient who shows certain precancerous signs, may need a colectomy (colon removal). When a colectomy is performed, a piece of the small intestine (ileum) is pulled through an opening in the abdomen and fashioned surgically to allow attachment of a special bag to catch the body's waste (feces). This opening, which remains for the duration of the patient's life, is called an ileostomy.

KEY TERMS

Endoscopy—A medical examination in which an instrument called an endoscope is passed into an area of the body (the bladder or intestine, for example). The endoscope usually has a fiber-optic camera, which allows the operator to see a greatly magnified image on a video screen.

Immune system—The system of the body that is responsible for producing various cells and chemicals that fight off infection by viruses, bacteria, fungi, and other foreign bodies. In autoimmune disease, these cells and chemicals are turned against the body itself.

Inflammation—The result of the body's attempts to fight off and wall off an area that is infected. Inflammation results in redness, heat, swelling, and loss of function.

Expected results

Remission refers to a disease's becoming inactive for a period of time. The rate of remission of IBD (after a first attack) is nearly 90%. Those individuals whose colitis is confined primarily to the left side of the large intestine have the best prognosis. Those individuals with extensive colitis, involving most or all of the large intestine, have a much poorer prognosis. Some studies show that about 10% of these patients have died within 10 years after diagnosis. About 20–25% of all IBD patients require colectomy. Unlike the case for patients with Crohn's disease, however, such radical surgery results in a cure of the disease.

Resources

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Crohn's and Colitis Foundation of America, 386 Park Ave. South, 17th Floor, New York, NY, 10016-8804, (800) 932-2423, http://www.ccfa.org/.

Belinda Rowland
David Edward Newton, Ed.D.

Influenza

Definition

Usually referred to as the flu or grippe, influenza is a highly infectious respiratory disease. Its name comes from the Italian word for "influence," because people in eighteenth-century Europe thought that the disease was caused by the influence of bad weather. Later people learned that flu is caused by a virus. When the influenza virus is inhaled, it attacks cells in the upper respiratory tract, causing such typical flu symptoms as **fatigue**, **fever** and **chills**, a hacking **cough**, and body aches. Although the stomach or intestinal flu is commonly blamed for stomach upsets and **diarrhea**, the influenza virus affects humans less often than is commonly believed. According to the Centers for Disease Control, approximately 5% to 20% of the U.S. population contracts the flu each year.

Description

Influenza is considerably more debilitating than the **common cold**. Influenza outbreaks occur suddenly, and infection spreads rapidly. The annual death toll attributable to influenza and its complications averages 20,000 in the United States alone. In the 1918–1919 Spanish flu pandemic, the death toll reached a staggering 20–40 million worldwide. Approximately 500,000 of these fatalities occurred in North America.

Influenza outbreaks occur on a regular basis. The most serious outbreaks are pandemics, which affect millions of people worldwide and last for several months. The 1918–1919 influenza outbreak serves as the primary example of an influenza pandemic. Pandemics also occurred in 1957 and 1968 with the Asian flu and Hong Kong flu, respectively.

Epidemics are widespread regional outbreaks that occur every two to three years and affect 5–10% of the population. A regional epidemic is shorter lived than a pandemic, lasting only several weeks. Finally, there are smaller outbreaks each winter that are confined to specific locales.

There are three types of influenza viruses, identified as A, B, and C. Influenza A can infect a range of animal species, including humans, pigs, horses, and birds, but only humans are infected by types B and C. Influenza A is responsible for most flu cases, while infection with types B and C virus are less common and cause a milder illness.

In the United States, 90% of all deaths from influenza occur among persons older than 65. Flu-related deaths have increased substantially in the United States since the 1970s, largely because of the **aging** of the American population. In addition, elderly persons are vulnerable because they are often reluctant to be vaccinated against flu.

A new concern regarding influenza is the possibility that hostile groups or governments could use the virus as an agent of bioterrorism. A report published in early 2003 noted that Type A influenza virus has a high potential for use as such an agent because of the virulence of the Type A strain that broke out in Hong Kong in 1997 and the development of laboratory methods for generating large quantities of the virus. The report recommended the stockpiling of present antiviral drugs and speeding up the development of new ones.

In 2008, the Centers for Disease Control and Prevention (CDC) issued a health alert stating that the number of children's deaths from influenza in the

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2006–2007 flu season was five times greater than in past years. The agency investigated whether bacteria such as staphylococcus can cause illnesses such as influenza. During the 2006–2007 flu season, the CDC learned of 73 children whose deaths were related to influenza, compared to 47 and 46 children's deaths in the two previous years.

Causes and symptoms

Approximately one to four days after infection with the influenza virus, the victim is hit with an array of symptoms. Symptoms are usually sudden, although the sequence can be quite variable. They include the onset of **headache**, **sore throat**, dry cough, and chills, nasal congestion, fatigue, malaise, overall soreness, and a fever that may run as high as 104°F (40°C). Some patients may experience **pain** when they inhale, known as pleuritic chest pain. Flu victims feel extremely tired and weak and may not return to their normal energy levels for several days or weeks.

Influenza complications usually arise from bacterial **infections** of the lower respiratory tract. Signs of a secondary respiratory infection often appear just as the patient seems to be recovering. These signs include high fever, intense chills, chest pains associated with breathing, and a productive cough or sinus discharge with thick yellowish green sputum. If these symptoms appear, medical treatment is often necessary. Other secondary infections, such as sinus or ear infections, may also require medical intervention. Heart and lung problems, and other chronic diseases, can be aggravated by influenza, which is a particular concern with elderly patients.

With children and teenagers, it is advisable to be alert for symptoms of Reye's syndrome, a rare, but serious complication that occurs when children are given aspirin. Symptoms of Reye's syndrome are **nausea** and **vomiting**, and more seriously, neurological problems such as confusion or delirium. The syndrome is primarily associated with the use of aspirin to relieve flu symptoms in children.

Diagnosis

Although there are specific laboratory tests to identify the flu virus strain from respiratory samples, doctors typically rely on a set of symptoms and the presence of influenza in the community for diagnosis. Specific tests are useful to determine the type of flu in the community, but they do little for individual treatment. Doctors may administer such tests as throat or sinus cultures or blood tests to identify secondary infections.

After 1999, however, seven rapid diagnostic tests for flu became commercially available. These tests appear to be especially useful in diagnosing flu in children, allowing doctors to make more accurate treatment decisions in less time.

Treatment

The patient should drink plenty of fluids and eat nutritious foods. Chicken soup with **ginger**, scallions, and rice noodles is nutritious and has healing powers. Rest, to allow the body to fight infection, is very important. Gargling with salt water (half teaspoon salt in one cup of water) helps to soothe a sore throat. A vaporizer with **eucalyptus** or Vicks makes the patient feel more comfortable by easing breathing and aiding sleep. Applying Vicks ointment over chest and back assists and speeds recovery. Returning to normal activities too quickly invites a possible relapse or complications.

Herbals

Herbal teas and other preparations can be taken to stimulate the immune system, for antiviral activity, and to relieve symptoms. The following herbs are used to treat influenza:

- Ginger (*Zingiber officinalis*) reduces fever and pain, has a sedative effect, settles the stomach, and suppresses cough.
- Forsythia (*Forsythia suspensa*) fruit can be taken as a tea for its anti-inflammatory, fever reducing, and antimicrobial properties.
- Honeysuckle (*Lonicera japonica*) flower can be taken as a tea for its anti-inflammatory, fever reducing, and antimicrobial properties.
- Anise seed (*Pimpinella anisum*) can be added to tea to expel phlegm, induce sweating, ease nausea, and ease stomach gas.
- Slippery elm (*Ulmus rubra*) can be taken as a tea or slurry to soothe sore throat and ease cough.
- Echinacea (*Echinacea purpurea* or *angustifolia*), in clinical studies, reduced flu symptoms, including sore throat, chills, sweating, fatigue, weakness, body aches, and headaches. The usual dosage is 500 mg thrice on the first day, then 250 mg four times daily thereafter.
- Goldenseal (*Hydrastis canadensis*) has fever reducing, antibacterial, anti-inflammatory, and antitussive properties. The usual dose is 125 mg three to four times daily. Goldenseal should not be taken for more than one week.

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- Astragalus (*Astragalus membranaceus*) boosts the immune system and improves the body's response to stress. The common dose is 250 mg of extract four times daily.
- Cordyceps (*Cordyceps sinensis*) modulates and boosts the immune system and improves respiration. The usual dose is 500 mg two to three times daily.
- Elder (*Sambucus nigra*) has antiviral activity, increases sweating, decreases inflammation, and decreases nasal discharge. In a study, elderberry extract reduced flu symptoms within two days whereas placebo took six days. The usual dose is 500 mg of extract thrice daily. Also use 2 tsp of dried flowers in 1 cup of water as a tea.
- Schisandra (*Schisandra chinensis*) helps the body fight disease and increases endurance.
- Grape (*Vitis vinifera*) seed extract has antihistamine and anti-inflammatory properties. The usual dose is 50 mg three times daily.
- Eucalyptus (*Eucalyptus globulus*) or peppermint (*Mentha piperita*) essential oils added to a steam vaporizer may help clear chest and nasal congestion.
- Boneset infusion (*Eupatorium perfoliatum*) relieves aches and fever.
- Yarrow (*Achillea millefolium*) relieves chills.

Other remedies

Acupuncture and **acupressure** are said to stimulate natural resistance, relieve nasal congestion and headaches, fight fever, and calm coughs, depending on the points used.

A homeopathic remedy called *Oscillococcinum* may be taken at the first sign of flu symptoms and repeated for a day or two. This remedy is said to shorten the duration of flu by one or two days. Although oscillococcinum is a popular flu remedy in Europe; however, a research study published in 2003 found it to be ineffective.

Other homeopathic remedies recommended vary according to the specific flu symptoms present. *Gelsemium* (*Gelsemium sempervirens*) is recommended to combat weakness accompanied by chills, a headache, and nasal congestion. *Bryonia* (*Bryonia alba*) may be used to treat muscle aches, headaches, and a dry cough. For restlessness, chills, hoarseness, and achy joints, poison ivy (*Rhus toxicodendron*) is recommended. Finally, for soreness and a dry cough or chills, *Eupatorium perfoliatum* is suggested.

Hydrotherapy can be used. A bath to induce a fever will speed recovery from the flu. While supervised, patients should take a bath as hot as they can tolerate and remain in the bath for 20–30 minutes. While in the bath, the patients drink a cup of **yarrow** or elderflower tea to induce sweating. During the bath, a cold cloth is held on the forehead or at the nape of the neck to keep the temperature down in the brain. Patients are assisted when getting out of the bath (they may feel weak or dizzy) and then get into bed and cover up with layers of blankets to induce more sweating.

Supplemental vitamins are recommended for treating influenza and include 500–2000 mg **vitamin C**, 400 IU to 500 IU of **vitamin E**, 200 micrograms to 300 micrograms **selenium**, and 25,000 IU beta-carotene. **Zinc** lozenges are helpful, as is supplemental zinc at 25 mg per day for two weeks or more.

Traditional Chinese medicine (TCM) uses mixtures of herbs to prevent flu as well as to relieve symptoms once a person has fallen ill. There are several different recipes for these remedies, but most contain ginger and Japanese **honeysuckle** in addition to other ingredients.

Allopathic treatment

Because influenza is a viral infection, antibiotics are useless in treating it. However, antibiotics are frequently used to treat secondary infections.

Over-the-counter medications are used to treat flu symptoms. Any medication that is designed to relieve such symptoms as pain and coughing will provide some relief. The best medicine for symptoms is an analgesic, such as aspirin, acetaminophen, or naproxen. Without a doctor's approval, aspirin is generally not recommended for people under 18 owing to its association with Reye's syndrome, a rare aspirin-associated complication seen in children recovering from viral infections. Children should receive acetaminophen or ibuprofen to treat their symptoms.

There are several antiviral drugs marketed for treating influenza. To be effective, treatment should begin no later than two days after symptoms appear. Antivirals may be useful in treating patients who have weakened immune systems or who are at risk for developing serious complications. They include oseltamavir phosphate (Tamiflu) and zanamavir (Relenza), which have few side effects but can cause **dizziness**, jitters, and **insomnia**. Other antiviral medications are amantadine (Symmetrel, Symadine) and rimantadine (Flumandine), which work against Type A influenza. Amantadine and rimantadine can cause side effects such as nervousness, **anxiety**, lightheadedness, and nausea. Severe side effects, including seizures, delirium, and hallucination, are rare and are nearly always limited to people who have kidney

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problems, seizure disorders, or psychiatric disorders. Zanamavir and oseltamavir phosphate work against both Types A and B influenza.

At the 2006 Interscience Conference on Antimicrobial Agents and Chemotherapy, the first research was presented showing that patients admitted to the hospital with either influenza or **pneumonia** as a complication of the former experienced a reduction in complications and mortality if they were given oseltamavir phosphate. In the study, patients were given the medication longer than 48 hours after symptoms began, a timeframe usually considered outside the drug's limits of maximum effectiveness. In 2007, officials in Japan ordered the manufacturer of oseltamivir phosphate to include a warning that the drug may have the potential to cause severe neuropsychiatric effects in adolescents ages 10 to 19 years.

Expected results

Following proper treatment guidelines, healthy people under the age of 65 usually suffer no long-term consequences associated with flu infection. The elderly and the chronically ill are at greater risk for secondary infection and other complications, but they can also enjoy a complete recovery.

Most people recover fully from an influenza infection, but it should not be viewed complacently. Influenza is a serious disease, and approximately 1 in 1,000 cases proves fatal.

Prevention

The Centers for Disease Control and Prevention recommend that people get an influenza vaccine injection each year before flu season starts. In the United States, flu season typically runs from late December to early March. Vaccines should be received two to six weeks prior to the onset of flu season to allow the body enough time to establish immunity.

Each season's flu vaccine contains three virus **strains** that are the most likely to be encountered in the coming flu season. The virus strains used to make the vaccine are inactivated and will not cause illness. When there is a good match between the anticipated flu strains and the strains used in the vaccine, the vaccine is 70–90% effective in people under 65. Because immune response diminishes somewhat with age, people over 65 may not receive the same level of protection from the vaccine, but even if they do contract the flu, the vaccine diminishes the severity and helps prevent complications.

KEY TERMS

Bioterrorism—The intentional use of disease-causing microbes or other biologic agents to intimidate or terrorize a civilian population for political or military reasons. Type A influenza virus could be used as an agent of bioterrorism.

Common cold—An illness caused by an upper respiratory viruses. Usual symptoms include nasal congestion, coughing, sneezing, throat irritation, and a low-grade fever.

Epidemic—A widespread regional disease outbreak.

Guillain-Barré syndrome—Also called acute idiopathic polyneuritis, a neurologic syndrome that can cause numbness in the limbs and muscle weakness following certain viral infections.

Pandemic—Worldwide outbreak of an infection, afflicting millions of people.

Secondary infection—An infection by a microbe that occurs during an infection by a different kind of microbe.

It should be noted that certain people should not receive an influenza vaccine. Infants younger than six months have immature immune systems and will not benefit from the vaccine. Because the vaccines are prepared using hen eggs, people who have severe **allergies** to eggs or other vaccine components should not receive the influenza vaccine. Some persons may receive a course of amantadine or rimantadine, which are 70–90% effective in preventing influenza.

Certain groups are strongly advised to be vaccinated because they are at greater risk for influenza-related complications:

- All people 50 years and older
- Residents of nursing homes and chronic-care facilities
- Children ages 6 months to 5 years
- Pregnant women
- People of any age with certain chronic medical conditions
- Anyone in contact with the above groups, such as teachers, care givers, health-care personnel, and family members

In addition to an injectable flu vaccine, an intranasal spray vaccine (made from a live virus) may be given to healthy persons ages 2 years 49 years of age who are not pregnant.

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The following dietary supplements may be taken to help prevent influenza:

- Elderberry to prevent influenza virus from infecting cells
- Astragalus, 250–500 mg daily
- Multivitamin with zinc
- Vitamin C, 500 mg
- Echinacea, at the first sign of malaise or infection, take 3–5 ml of tincture or 2 tablets three or four times daily for three to 10 days.

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ORGANIZATIONS

Centers for Disease Control and Prevention, 1600 Clifton Road, NE, Atlanta, GA, 30333, (888) CDC-FACTS (888-232-3228), http://www.cdc.gov/.

National Institute of Allergy and Infectious Diseases (NIAID), 6610 Rockledge, Bethesda, MD, 20892-6612, (866) 284-4107, http://www.niaid.nih.gov.

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Ingrown nail

Definition

Ingrown nail refers to the condition in which the edge of a nail cuts into the adjacent skin fold, causing **pain**, redness, and swelling.

Ingrown toenails. *(Custom Medical Stock Photo. Reproduced by permission.)*

Description

Ingrown nail (onychocryptosis) occurs when the nail plate (the horny covering) grows into and cuts the skin alongside the nail (lateral nail fold). Ingrown toenails make up 3–5% of all foot problems. Most cases of ingrown nail occur in men between the ages of 10–30 years. In this age group, males are affected twice as often as females. In older adults, the incidence is equal. There are three major types of ingrown nail: subcutaneous ingrown nail in which the nail grows under the skin; overcurvature of the nail plate; and hypertrophy (overgrowth) of the lateral nail fold.

Ingrown nails occur most often on the big toe. Penetration of the nail into the skin causes inflammation (swelling and redness). Infection by bacteria or fungi may follow. Severe infection may lead to **abscess** formation, characterized by an oozing, pus-filled blister. Small, translucent, red bumps called granulation tissue may develop along the lateral nail fold.

Causes and symptoms

Ingrown nails are most commonly caused by incorrect cutting of the nails and wearing poorly-fitting shoes. Other causes of ingrown nail include:

- abnormally long toes
- overcurvature of the nail
- excessive sweating
- shoes that put pressure on the toes (pointed-toe, high-heeled)
- poor foot hygiene
- high lateral nail folds
- discrepancy between the widths of the nail and nail bed

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KEY TERMS

Granulation tissue—Small, red, bumpy, velvety-looking tissue produced during the healing of wounds.

Lateral nail fold—The fold of skin along the side of the nail.

Nail plate—The horny plate covering the tips of the fingers and toes. Commonly called the nail.

Onychocryptosis—The medical term for ingrown nail.

- improper alignment of the large toenail
- repeated trauma to the large toe

Persons who are at increased risk of developing ingrown nails include people with arthritis, immune system deficiencies, neoplasms (tumors), **obesity**, and circulatory disorders.

The symptoms of ingrown nail include swelling, redness, and pain in the lateral nail fold. Increased swelling, pus drainage, and ulceration (tissue destruction) can occur as the condition progresses. Advanced onychocryptosis is characterized by long-term swelling, the formation of granulation tissue, and lateral fold overgrowth.

Diagnosis

Ingrown nail is easily diagnosed in a physical examination done by a family physician, a podiatrist (foot specialist), or a dermatologist (skin specialist).

Treatment

Because of the possibility of serious complications, a physician should be consulted for treatment of severe and/or infected ingrown nails. Alternative treatments for treating ingrown nail include:

- Ayurveda. Ayurvedic principles state that persons whose constitutions are dominated by vata and kapha have stronger nails and are prone to ingrown nails. Ingrown nails are treated with warm water soaks followed by application of a solution of equal parts tea tree and neem oils under the nails.
- Herbal therapy. When an ingrown nail is forming, the toe should be soaked for 15–30 minutes in five drops each of hypericum and calendula tinctures diluted in 1/2 pint of warm water. Afterward, the toe should be wrapped in linen, placing it between the fold and the nail.
- Homeopathy. Preparations of *Hepar sulph* or *Silica* in 6c potency may be taken every 12 hours for two weeks, to reduce the inflammation around the nail.
- Hydrotherapy. To treat ingrown nail, the patient should soak the foot in hot, soapy water for 20 minutes, trim the nail square, wrap the toe in a hot compress, and cover it with a dry cloth overnight. In the morning, the patient should trim the nail into a U shape and place a bit of cotton between the nail and the fold. The cotton should be kept in place until the nail grows out.
- Massage. If an ingrown nail is developing the patient should push the skin away from the nail. Repeated massage of the overgrown lateral nail folds can reduce pain and separate the fold away from the nail.

Allopathic treatment

Nonsurgical

Nonsurgical methods of treating ingrown nails focus on eliminating infection with medications and separating the ingrown nail from the lateral nail fold. Whenever possible, the offending nail is clipped, and the patient is instructed to soak the foot in water containing Epsom salts and povidone-iodine thrice daily. Procedures used to separate the nail from the fold include inserting a piece of fabric (moistened with antiseptics), plastic, or metal between the nail and the fold until the nail grows out. Cryotherapy, in which the affected nail fold is frozen with liquid nitrogen, is also used. Cauterization (destruction of tissue using heat) may be performed to eliminate granulation tissue. A metal brace may be worn on the toe for several months to flatten overcurvature.

Surgical

In cases of severe ingrown nail or ineffective nonsurgical treatment, part or all of the nail is surgically removed. Most commonly, only a portion of the nail is removed. Ingrown nail recurs in 60%–80% of the patients. If nail regrowth is expected to cause a recurrence of ingrown nail, then the nail matrix (where nail growth occurs) is destroyed, which prevents nail regrowth. In most cases, only local anesthesia is needed for surgical treatment.

Expected results

Although natural remedies can be effective in healing minor ingrown nails, prevention is the best solution. Many cases of ingrown nail require surgical treatment.

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Complications of ingrown toenail include infection, osteomyelitis (infection of the bone), and **gangrene** (tissue death). The elderly are at increased risk of complications because of decreased sensation resulting from such conditions as diabetes, **heart disease**, or arteriosclerosis (hardening of the arteries).

Prevention

Ingrown nails may be prevented by:

- clipping nails straight across
- leaving the nail edge slightly longer than the end of the toe
- not trimming the sides of nails
- wearing shoes with ample toe space
- not pulling or tearing at the toenails

Resources

BOOKS

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Ikard, Robert W. "Onychocryptosis." *Journal of the American College of Surgeons*, 187 (July 1998): 96-102.

Belinda Rowland

Inositol

Description

Inositol is a natural glucose isomer that is normally found in animal cells, with its highest concentration in the brain and heart. It is also referred to as myoinositol, IP6, phytic acid, and vitamin B8 (although it is not officially a vitamin as the body can make it). It aids the liver in processing fats and also plays a role in nerve transmission and muscle functions. Inositol is also available in supplement form.

Inositol is not considered an essential nutrient. Foods such as beans, cantaloupe, citrus fruits, nuts, whole grains, and seeds provide a substance known as phytic acid. When phytic acid comes into contact with the bacteria normally found in the stomach, inositol is released.

General Use

Inositol is used to treat **depression** and panic disorders. It has been found to be at low levels in the spinal fluid of persons suffering from depression. Furthermore, inositol plays a role in the processing of serotonin, a neurotransmitter in the brain. Low levels of serotonin have been associated with clinical depression. Because of these associations, inositol is believed to provide benefits for persons with clinical depression.

The use of inositol in treating the following disorders continues in the 2000s to be investigated:

- Panic disorders
- Polycystic ovary syndrome
- Obsessive-compulsive disorders
- Alzheimer's disease
- Autism
- Post-traumatic stress disorders

More investigation is needed to determine conclusive evidence of benefit for these conditions.

In 2001, data were released from a study comparing inositol with fluvoxamine in the treatment of **obsessive-compulsive disorder**. Inositol showed fewer side effects, an attractive benefit for a drug designed to treat a **panic disorder**. But further investigation was suggested.

In 1999, a study conducted in Israel recommended that manic patients on lithium therapy eat an inositol-free diet because of the role inositol plays in blocking the body's ability to use lithium. A study released in 2004 found that persons with **psoriasis** who were taking lithium benefited from inositol supplementation. Psoriasis patients who were not undergoing lithium treatment did not realize this benefit.

Some researchers believe that inositol hexaphosphate (IP6) is capable of launching **cancer** cells on a path to destruction. The cancer-related studies have used animal subjects. In these tests, IP6 supplementation resulted in prevention of cancerous tumors in the colon, prostate, lung, skin, and other areas. It also showed a possible ability to improve the effectiveness of hormone or chemotherapy treatments. A preliminary study performed on humans indicated that IP6 supplementation may cause shrinkage of a malignant lung tumor. As of 2008, IP6 had not been studied as a treatment for humans with cancer. The anti-cancer properties of IP6 were first studied in the 1980s at the University of Maryland. Pathologist Abulkalam Shamsuddin first began studying the compound's anti-cancer capabilities at that time.

Inositol is sometimes taken in supplement form by bodybuilders and athletes, who desire its potential role in fat distribution and promoting a calm mind.

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KEY TERMS

Isomer—Two compounds that have the same molecular formulas but different chemical structures.

Neurotransmitter—A substance involved in the transmission of nerve impulses.

Preparations

There is no recommended dietary intake for inositol. However, the typical diet in the United States provides approximately 1.0 gram of inositol per day. In research settings, doses up to 18 grams per day have been used.

Inositol supplements are available in capsule, tablet, and powder forms.

Precautions

Inositol supplementation may inhibit the body's ability to absorb minerals, including **calcium**, **iron**, and **zinc**, prompting concern particularly in regards to use in infants. As of 2008, long-term safety studies had not been performed. Its safety had not been established for pregnant or breastfeeding women, young children, and persons with liver or kidney ailments. A number of experts advise consumers to obtain inositol through dietary sources before taking the supplemental form.

Side Effects

The most common side effects are **gas** and **diarrhea**. Consumers should stop taking inositol and report to a healthcare provider immediately any sign of an allergic reaction such as **hives**, rash, **itching**, tightness in the throat or chest, or difficulty breathing. Like any supplement, inositol should be taken under the guidance of a healthcare professional.

Interactions

Inositol should not be taken with lithium, except under the guidance of a physician. Inositol is said to block the absorption of the minerals calcium, iron, and zinc.

ORGANIZATIONS

American Cancer Society, 1599 Clifton Rd. NE, Atlanta, GA, 30329, (800) 227-2345, www.cancer.org.

Rhonda Cloos, RN

Insect bites *see* **Bites and stings**

Insomnia

Definition

Insomnia is the inability to obtain an adequate amount or quality of sleep. The difficulty may be in falling asleep, remaining asleep, or waking up too early. A person may experience one or all of these symptoms. People with insomnia do not feel refreshed when they wake up. Insomnia affects more than 70 million people, according to the National Institutes of Health. The sleeplessness is a symptom that may be caused by physical or mental conditions or circumstances. Furthermore, research indicated that insomnia may also be a medical condition, according to the National Sleep Foundation (NSF).

Description

Adults need approximately seven to eight hours of sleep each night. Teenagers should get about nine hours of sleep, and infants need to sleep from 16 to 18 hours of sleep each day. Sleep is essential for mental and physical restoration. It is a cycle with two separate states: rapid eye movement (REM), the stage in which most dreaming occurs; and non-REM (NREM). Four stages of sleep take place during NREM: stage I, when the person passes from relaxed wakefulness; stage II, an early stage of light sleep; stages III and IV, which are increasing degrees of deep sleep. Most stage IV sleep (also called delta sleep) occurs in the first several hours of sleep. A period of REM sleep normally follows a period of NREM sleep.

Disrupted sleep

Sleeplessness or insomnia may be caused by a physical condition such as **obesity**, a mental condition such as **depression**, shift work with irregular hours, or a traumatic event. In the days immediately after the terrorist attacks on September 11, 2001, 47% of Americans rated their sleep as "poor," or "fair," according to NSF's "2002 Sleep in America" poll. In comparison, 27% of poll participants rated sleep as poor or fair for most nights of that year.

The foundation's 2005 poll indicated that women were more likely to experience insomnia than men. NSF explored that demographic in the "2007 Sleep in America" poll of women between the ages of 18 and 64. That study showed that sleep problems such as insomnia were experienced by 72% of working mothers and 68% of single working women. Furthermore, 74% of stay-at-home mothers displayed symptoms of insomnia during a couple nights each week.

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That poll paralleled other research that showed that women are 1.3 more likely to report insomnia than men. They may experience sleeplessness before and at the onset of their menstrual cycle, during **pregnancy**, and **menopause**. In addition, the foundation reported that people over the age of 65 are more likely to be bothered by insomnia than younger individuals.

Furthermore, people who are divorced, widowed, or separated are more likely to have the problem than those who are married. In addition, insomnia is more frequently reported by those with lower socioeconomic status.

Insomnia is classified both by its nightly symptoms and its duration. Sleep-onset insomnia refers to difficulty falling asleep. Maintenance insomnia refers to waking frequently during the night or waking early. Insomnia is also classified in relation to the number of sleepless nights. Short-term, or transient, insomnia is a common occurrence and usually lasts only a few days. Long-term, or chronic, insomnia lasts more than three weeks. This condition increases the risk for injuries in the home, at the workplace, and while driving because of the person experiences daytime sleepiness and decreased concentration ability. Chronic insomnia could also lead to mood disorders such as depression.

Causes and symptoms

Transient insomnia is often caused by a temporary situation in a person's life such as an argument with a loved one, a brief medical illness, or **jet lag**. When the situation is resolved or the precipitating factor disappears, the condition goes away, usually without medical treatment.

Prescription drugs such as **asthma** medicine, steroids, and anti-depressants may cause insomnia. Sleeplessness may also be a side effect of over-the-counter products such as nasal decongestants and appetite suppressants.

Chronic insomnia usually has different causes, and there may be more than one factor contributing to sleeplessness. Causes of insomnia include:

- A medical condition or its treatment, including sleep apnea, diabetes, arthritis, a heart condition, and asthma
- Use of substances such as caffeine, alcohol, and nicotine
- Psychiatric conditions such as mood or anxiety disorders
- Stress or depression, such as sadness caused by the loss of a loved one or a job.
- A change in work shift
- A work schedule with nontraditional hours. Shift workers who may experience insomnia include medical professionals, truck drivers, the military, and people working at businesses open 24 hours a day.
- Sleep-disordered breathing, such as snoring
- Periodic jerky leg movements, *nocturnal myoclonus*, which occur just as the individual is falling asleep.
- Restless legs syndrome, which involves the urge to move the legs. The person may also experience feelings such as tingling or cramping.
- Repeated nightmares or panic attacks during sleep

Excessive worrying about whether the person will be able to fall asleep may also cause insomnia. The concern creates so much **anxiety** that the individual's bedtime rituals and behavior actually trigger insomnia, a condition called psychophysiological insomnia.

Symptoms of insomnia

People who have insomnia do not start the day refreshed from a good night's sleep. They may have difficulty falling asleep and commonly lie in bed tossing and turning for hours. Or the individual may go to sleep without a problem but wakes in the early hours of the morning. The person is either unable to go back to sleep or drifts into a restless, unsatisfying sleep. This is a common symptom in the elderly and those suffering from depression. Sometimes sleep patterns are reversed and the individual has difficulty staying awake during the day and takes frequent naps. The sleep at night is fitful and frequently interrupted.

Diagnosis

Insomnia, unlike some medical conditions, is easily recognizable, as people know when they are not getting enough sleep. The key to treating insomnia is determining its causes. Some people can identify sleep-inhibiting factors such as a death in the family or a hectic work schedule with too much caffeine consumption and not enough **exercise**. A doctor will take factors such as these into account when making a diagnosis.

The physician's diagnosis is based on the patient's reported signs and symptoms. The doctor may review a patient's health history or order tests to determine if a medical condition is causing the insomnia. The physician may ask if the patient is depressed, in **pain**, under **stress**, or taking medications, according to the National Sleep Foundation. The doctor may ask about disruptions in a patient's life such as working nontraditional shifts or traveling across different time zones.

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It may be useful for the patient to keep a daily record for two weeks of sleep patterns, food intake, use of alcohol, **caffeine**, nicotine, medications, exercise, and any other information recommended by the physician. If the patient has a bed partner, information can be obtained about whether the patient snores or is restless during sleep. This information, together with a medical history and physical examination, can help confirm the doctor's assessment.

A wide variety of healthcare professionals can recognize and treat insomnia. When a patient with chronic insomnia does not respond to treatment, or the condition is not adequately explained by the patient's physical, emotional, or mental circumstances, then more extensive testing by a specialist in sleep disorders may be warranted.

Treatment

In both alternative and conventional medicine, treatment of insomnia includes alleviating or coping with any physical and emotional problems that contribute to the condition. Also effective is exploring changes in lifestyle that will improve the situation.

Changes in behavior

Patients can make changes in their daily routine that are simple and effective in treating insomnia. Eating a healthy diet rich in calcium, **magnesium**, and the B vitamins is also beneficial.

Patients should go to bed only when sleepy and use the bedroom only for sleep or sex. Activities such as reading, watching television, or snacking should take place elsewhere. If people are unable to go to sleep, they should go into another room and do some quiet activity such as reading. People should return to bed only when sleepy. Patients should set the alarm and get up every morning at the same time, no matter how much they have slept, to establish a regular sleep-wake pattern. Naps during the day should be avoided, but if absolutely necessary, then a 30-minute nap early in the afternoon may not interfere with sleep at night.

Another successful technique is called sleep-restriction therapy, restricting the time in bed to the actual time spent sleeping. This approach allows a slight sleep debt to build up, which increases the individual's ability to fall asleep and stay asleep. If a patient sleeps five hours a night, the time in bed is limited to 5–5.5 hours. The time in bed is gradually increased in small segments, with the individual rising at the same time each morning; at least 85% of the time in bed must be spent sleeping.

Mind and body relaxation

Incorporating **relaxation** techniques into bedtime rituals helps a person go to sleep faster and improves the quality of sleep. These, alone or in combination with other relaxation techniques, can safely promote sleepiness. Also effective are massage techniques such as **shiatsu**, the traditional Japanese form of body work. Gentle pressure is applied to points of the body to bring on sleep.

Learning to substitute pleasant thoughts for unpleasant ones (imagery training) helps reduce worrying. Another technique is using recordings that combine the sounds of nature with soft relaxing music. **Meditation**, **prayer**, and breathing exercises could also be effective.

Insomnia may be treated professionally through techniques such as cognitive therapy. The therapist works with the patient to discover attitudes and feelings that disrupt sleep.

Herbal remedies

Many alternative treatments are effective in treating both the symptom of insomnia and its underlying causes. Much treatment is centered on herbal remedies, but the United States Food and Drug Administration does not regulate these treatments, which means that the remedies have not proven to be safe or effective. Furthermore, ingredients are not standardized to comply with regulations. People should consult with their healthcare provider or complementary medicine practitioner before taking herbal remedies. This is especially important because some remedies such as **melatonin** interact with herbals like **valerian** and prescription medicines.

Valerian

Research up to the spring of 2008 indicated that valerian may help with insomnia. People who took valerian fell asleep more quickly and experienced improved slumber. Because of the herb's sedative properties, valerian is used to treat insomnia and anxiety. It is an approved remedy in the German Commission E Monographs, a guide to herbal remedies. Approved uses include sleeping disorders caused by nervousness.

Valerian's sedative properties have been studied in animals and people. As of the spring of 2008, valerian was regarded as probably safe when taken at the recommended dosage. The remedy did not appear to disrupt sleep cycles or REM sleep.

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Furthermore, a combination of valerian and **hops** could help with sleeplessness. Other herbs most recommended for treating insomnia include **skullcap** and ginseng. Herbal products are available in capsule, tincture, and powdered form. Some people treat insomnia by sipping a warm cup of tea made with an herb mixture such as valerian, **chamomile**, hops, **lemon balm**, **passionflower**, or **St. John's wort**.

Aromatherapy and hydrotherapy

Aromatherapy involves healing through **essential oils**, the aromatic extracts of plants. Essential oils may be used for a soothing bath; applied to the face, neck, shoulders, and pillow; or diffused in air.

Hydrotherapy consists of a warm bath, scented with an essence such as rose, **lavender**, or marjoram. Valerian may also be added to bath water.

Dream pillows

Another form of aromatherapy involves sleeping on a dream pillow. Also known as a sleep pillow, it can be made by sewing together two 8-inch pieces of fabric. There should be an opening to insert a tablespoon. Herbs such as hops, chamomile, and lavender are spooned into the dream pillow, which is placed under the bed pillow.

Melatonin

Melatonin is a natural hormone that is secreted from the brain's pineal gland. The gland regulates a person's biological clock, particularly day and night cycles. Melatonin is generally used as a jet lag remedy. It may also help establish sleep patterns for shift workers. While melatonin may help people fall asleep more quickly, studies indicated limited success when it was used for treating insomnia. Melatonin is not regulated by the FDA, so the long-term effects of taking it are not known.

Traditional Chinese medicine

Traditional Chinese medicine (TCM) treatments for insomnia include **acupuncture** and herbal remedies. Acupuncture involves the insertion of needles to manipulate energy flows around the body. Acupuncture is also applied to the treatment of conditions, including anxiety.

In TCM, herbs are used as remedies in teas and other preparations. Treatments for insomnia include reishi, a medicinal mushroom available in extract form. However, the side effects of reishi could include **dizziness** and nose bleeds, so it is important to consult with a healthcare professional before taking this remedy.

Light therapy

In **light therapy**, natural or artificial light is used to boost serotonin, a neurotransmitter in the brain related to reducing anxiety. This therapy is used to treat **seasonal affective disorder**, a condition that some people experience when there is less sunlight or fewer daylight hours. Some people with this disorder feel depressed during the winter, and their spirits pick up during the summer. Light therapy is used to combat the depression experienced during the winter. There were no known risks as of the spring of 2008.

A study on the use of bright light therapy to treat insomnia was described in the July 2005 edition of the professional journal *Sleep*. The research involved 24 men diagnosed with early-morning waking insomnia. During the two nights of the study, the men were exposed to light while watching television. Some received bright light (2,500-lux white light) from 8 p.m. to midnight the first night and from 9 p.m. to 1 a.m. the following night. The other subjects were in the dim-light control group. The subjects in the bright light group said they tended to sleep longer than they did before the treatment. They woke up later. When they did waken, they went back to sleep more quickly.

Allopathic treatment

A physician may determine that drug therapy is necessary to treat insomnia. Drugs may be prescribed if the patient is undergoing a crisis or insomnia persists after a patient has made lifestyle changes. However, drug therapy is regarded as a short-term remedy, not a solution.

Conventional medications given for insomnia include sedatives, tranquilizers, and anti-anxiety drugs. All require a doctor's prescription and may be habit-forming. They could lose effectiveness over time and can reduce alertness during the day. The medications should be taken up to four times daily or as directed for approximately three to four weeks. The dose will vary with the physician, patient, and medication. If insomnia is related to depression, then an antidepressant medication may be helpful.

Drugs prescribed for improving sleep are called hypnotics. This category includes benzodiazepines, which are prescribed for anxiety and insomnia. Benzodiazepines commonly prescribed for insomnia include triazolam (Halcion), tempazepam (Restoril), lorazepam (Ativan), alprazolam (Xanax), fluazepam (Dalmane), and oxazepam (Serax). Other medications prescribed for insomnia include zolpidem tartrate (Ambien), eszopiclone (Lunesta), and ramelteon (Rozerem).

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Over-the-counter sleep products include Nytol, Sominex, Unisom Nightime Tablets, and Tylenol PM. While these products are usually not addictive, some experts believe they are not very effective in sustaining stage IV sleep and could affect the quality of sleep.

Expected results

Insomnia has numerous causes and treatments, so the amount of time may vary before results are seen. A prescription drug may bring immediate results to someone coping with a spouse's death. An herbal remedy may not work immediately for a person who consumed excessive amounts of caffeine to stay awake at work after a sleepless night. A procedure such as cognitive therapy may take some time as therapist and patient work to resolve issues that hinder sleep.

Research has provided information about when some treatments take effect:

- Valerian is sold commercially in the form of capsules, extracts, and teas. The capsule or extract dosage ranges from 300 to 600 mg. As a sleep aid, it should be taken shortly before bedtime. People who have trouble falling asleep may see results quickly. It could take from two weeks to a month before a person with chronic insomnia experiences improved sleep.
- A combination of hops and valerian at bedtime could provide a good night's sleep.
- Melatonin is taken in a dose of from 0.3 to 3 mg an hour of retiring. When taken as a 3-mg dose one to two hours before bed for a maximum of four to five days per week, the dietary supplement melatonin was said to be effective in shortening the time before a person fell asleep. Side effects could include nightmares and sleepwalking.
- St. John's wort can take two weeks to take effect.
- A combination of alternative therapies should bring a difference in disturbed sleep within two to four days.
- Combinations of treatments could more quickly bring about an uninterrupted night of sleep. The person who reduces caffeine intake, walks for 15 minutes, and enjoys an herbal bath may discover that that combination brings restful sleep.
- Acupuncture is said to bring some people immediate relief. In small studies, people said that after treatment that it was easier to fall asleep and they remained asleep. This treatment is safe when it is done correctly.
- Light therapy proved to be effective in the treatment of men whose insomnia caused them to wake early. In that study, the men said they experienced an immediate benefit. However, no women were studied, and the research did not include people with other types of insomnia.

KEY TERMS

Biofeedback—A training technique that enables an individual to gain some element of control over involuntary body functions.

Mood disorder—A group of mental disorders involving a disturbance of mood, along with either a full or partial excessively happy (manic) or extremely sad (depressive) syndrome not caused by any other physical or mental disorder. Mood refers to a prolonged emotion.

Sleep apnea—A condition in which a person stops breathing while asleep. These periods can last up to a minute or more and can occur many times each hour. In order to start breathing again, the person must become semi-awake. The episodes are not remembered, but the following day the person feels tired and sleepy. If severe, sleep apnea can cause other medical problems.

Sleep disorder—Any condition that interferes with sleep. As of 2008, at least 84 have been identified, according to the American Sleep Disorders Association.

Prevention

Prevention of insomnia centers around the promotion of a healthy lifestyle. A balance of rest, recreation, and exercise in combination with stress management, regular physical examinations, and a healthy diet can do much to reduce the risk. Walking is also recommended. However, exercise should be done no more than three hours before bedtime.

Also to be avoided in the evening are drinks that contain caffeine such as coffee, tea, and colas. Chocolate contains a stimulant and may keep people awake. In addition, alcohol may initially make a person sleepy. However, it could have the opposite effect a few hours later.

Maintaining a comfortable bedroom temperature, reducing noise, and eliminating light are also helpful. The bedroom should be used only for sleeping, not watching television or reading.

Exercise, relaxation, and **nutrition** should be considered ongoing preventive measures. While life brings unexpected stresses and pressures, the person who is familiar with relaxation techniques is more prepared to cope with insomnia.

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American Medical Association, 515 N. State St., Chicago, IL, 60610, (800) 621-8335, http://www.ama-assn.org.

National Sleep Foundation, 1522 K St. NW, Suite 500, Washington, DC, DC, 20005, (202) 347-3471, http://www.sleepfoundation.org/.

Liz Swain

Insulin resistance

Definition

Insulin resistance is a condition in which cells, particularly those of muscle, fat, and liver tissue, display "resistance" to insulin by failing to take up and utilize glucose for energy and metabolism (insulin normally promotes take up and utilization of blood glucose from the blood stream). In its early stages, the condition is asymptomatic, but may develop into Type II Diabetes. Although there are several established risk factors, the underlying cause is unknown.

It has been estimated that 30 to 33 million Americans are insulin resistant, and the number appears to be increasing.

Description

Insulin resistance is initially asymptomatic, and in its early stages can be detected only by laboratory tests. These tests will show an abnormally high blood sugar (glucose) level, but not high enough to be considered pre-diabetic or diabetic. While the condition does not always lead to further problems, the majority of people who reach the pre-diabetic level go on to develop Type II Diabetes (formerly called Maturity Onset Diabetes.

Causes and symptoms

The cause of insulin resistance is unknown, although the condition has been seen to run in families, indicating that there is a genetic association. Being overweight, and lack of **exercise** are also associated with insulin resistance, although the nature of the relationship is not clear. Risk factors for insulin resistance are:

- having a family history of diabetes
- having a low HDL (good) cholesterol—and high serum lipids
- having high blood pressure
- having a history of diabetes during pregnancy, or having given birth to a baby weighing more than 9 pounds
- being a member of one of the racial groups that appear to have a high incidence of insulin resistance (African American, Native American, Hispanic American/Latino, or Asian American/Pacific Islander)
- having syndrome X
- being obese

In its mildest form, insulin resistance causes no symptoms, and is only recognizable on laboratory tests. In more severe cases, there may be dark patches on the back of the neck, or even a dark ring around the neck. The dark patches are called *Acanthosis nigricans* and may also cause darkening of skin color in the elbows, knees, knuckles, and armpits.

There is a constellation of symptoms now called metabolic syndrome or insulin resistance syndrome that is linked to insulin resistance. This syndrome was formerly called syndrome X. Metabolic syndrome is defined by the National **Cholesterol** Education Program as the presence of any three of the following conditions:

- excess weight around the waistline (waist measurement of more than 40 inches for men and more than 35 inches for women)
- high levels of serum triglycerides (150 mg/dL or higher)
- low levels of HDL, or "good," cholesterol (below 40 mg/dL for men and below 50 mg/dL for women)
- high blood pressure (130/85 mm Hg or higher)
- high fasting blood glucose levels (110 mg/dL or higher)

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KEY TERMS

Acanthosis nigricans—A localized darkening of the skin that is associated with insulin resistance. This is not seen in all cases, and is considered a rare disorder.

Diabetes—Any of several metabolic diseases affecting the body's use of blood sugars or the intake and excretion of fluids. In Type 2 diabetes, formerly called maturity onset diabetes, there is sufficient insulin, but the insulin is unable to penetrate the cell membrane.

Insulin—A hormone, secreted by the pancreas, which is essential for the body's ability to use glucose to provide energy. Inadequate insulin supplies result in Type 1 diabetes.

Metformin—An anti-diabetic drug of the biguanide class. This drug increases the sensitivity of cells to insulin, but is capable of causing very severe adverse reactions, including lactic acidosis and anemia.

Pioglitazone—An anti-diabetic drug of the thiazolidinedione class. This drug increases the sensitivity of the cells to insulin, but is capable of causing severe adverse reactions, including congestive heart failure.

Note that the numbers are those from an expert panel convened by the National Institutes of Health in 2001. Other panels of similarly qualified experts have given slightly different definitions.

Diagnosis

The only means of diagnosis for insulin resistance is laboratory test. While there are several tests that may be performed, the two most common screening tests are the **Fasting** Blood Sugar Test and Glucose Tolerance Test.

Fasting blood sugar measures the blood glucose level after a 12 hour fast (no food). A normal level, according to the United Sates National Institute of Diabetes and Digestive and Kidney Disease (NIDDK), should be below 100 mg/dL (milligrams of glucose in every deciliter of blood. A value in the n the 100 to 125 mg/dL range is considered evidence of insulin resistance, and is considered pre-diabetic. A value of 126 mg/dL is considered diabetic. (Blood sugar levels after a 12 hr fast are typically lower than this, and are controlled by pancreatic insulin secretion that transports blood glucose out of the blood and into the muscles, brain, organs, and other tissues.)

The glucose tolerance test is performed after the patient has had nothing but water for 10 to 16 hours. The patient has his blood drawn for a a baseline blood glucose level. Next, the patient drinks a special sweetened test drink that contains exactly 75 grams of glucose (pregnant women are normally given 100 grams of glucose.) Blood is drawn again at one half hour and each of the next six hours to compare blood glucose levels and watch their pattern in response to the sweet drink. Normally the blood sugar level is lower before the drink, rises quickly during the first few hours, and slowly drops again. In insulin resistance, the blood sugar rises but stays abnormally high, because it is resistant to being removed from blood into tissues by insulin. High blood sugar from food or the test glucose drink stimulates the pancreas to secrete insulin into the blood. However in insulin resistance, the insulin is secreted but only partially absorbed by the tissues. According to the National Diabetes Information Clearinghouse (NDIC) a normal level would be below 140 mg/dL 2 hours after the drink. If it is in the 140 to 199 mg/dL range 2 hours after drinking the solution, the diagnosis is impaired glucose tolerance (IGT) or prediabetes. A level of 200 or higher, if confirmed, represents a diagnosis of diabetes.

Treatment

Among the most important treatment modalities are diet and exercise, weight loss if obese, endocrine hormone correction- if unbalanced. In 2001, the National Institutes of Health completed the Diabetes Prevention Program (DPP), a clinical trial designed to find the most effective ways of preventing type 2 diabetes in overweight people with prediabetes. The researchers found that lifestyle changes reduced the risk of diabetes by 58 percent. Also, many people with prediabetes showed a return to normal blood glucose levels.

According to the DDP results, a mere half hour of brisk walking or bicycling five days a week can significantly reduce the risk of developing type 2 diabetes. Patients should use diet and exercise to reduce their body mass index (BMI) to 25 or below.

Smoking has been associated with insulin resistance, as well as with some of the more severe problems associated with diabetes. Discontinuing smoking should be a top priority.

A healthful diet, in addition to assisting in weight loss, may reduce serum lipids and reduce some of the risk factors for diabetes. One study recommended the

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Mediterranean diet as being the most beneficial for people with insulin resistance. Diet improvements include reducing sweets, desserts and high glycemic meals; eating balanced meals that contain protein, complex carbohydrates, fiber, greens and healthy oils, eating at regular times, and avoiding excess junk food and sugar.

No complimentary or alternative therapies have been proven to cure insulin resistance. Although several herbal remedies have been traditionally used for treatment of diabetes, none have been adequately documented as effective. Among medicinal plants shown to help lower elevated blood sugar are the Asian **bitter melon** and the Navaho Optunia cactus. Such herbal **bitters** as **dandelion** root and **yellow dock** can improve digestive strength and sometimes help; though no herbal remedy alone "cures" insulin resistance or diabetes. Guar gum, glucomannan, and **psyllium** seed all have demonstrated some ability to lower blood sugar in insulin resistance or diabetes, but none have been shown to be reliably effective for use in treatment of humans.

Allopathic treatment

Insulin resistance does not normally require drug therapy; however, some studies have shown that the drugs used to treat type 2 diabetes may delay development of diabetes. Two classes of dugs now used to treat diabetes act by increasing insulin sensitivity, the biguanides and the thiazolidinediones; the other drugs used to treat diabetes act in different ways.

Although drugs from both classes have been effective in treatment of insulin resistance, neither drug has been as effective as a regimen of diet and exercise. Both classes of drugs have the potential for very severe adverse effects.They are also not approved by the FDA for control of insulin resistance, although physicians may prescribe them for this use if the condition appears to be progressing without drug therapy. In one study, oral hypoglycemic drugs of various mechanisms that help reduce elevated blood blood glucose reduced the rate of disease progression from insulin resistance to diabetes by about one-third over a three year period.

Expected results

In mild, asymptomatic insulin resistance, proper treatment may lead to a complete reversal, with normalization of blood sugar.

Even if complete normalization is impossible, treatment will lead to control of the condition, and a significant reduction in its rate of progression to diabetes.

Prevention

In insulin resistance, prevention is even better than treatment. Maintaining a normal weight, a balanced diet, and a regular program of aerobic exercise is the best preventive measure.

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National Organization for Rare Disorders. 55 Kenosia Avenue PO Box 1968 Danbury, CT 06813-1968.

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Interstitial cystitis

Definition

Interstitial Cystitis is a chronic bladder disorder involving symptoms such as pelvic **pain**, urinary frequency and urgency, which occurs in the absence of infection.

Description

Interstitial Cystitis (IC) is a condition affecting the bladder, often presenting with urinary symptoms and pelvic pain. Although many of the symptoms are similar to urinary tract **infections** (UTIs), IC is distinct in that a criterion for diagnosis is that no infectious organisms are present. The cause of IC is not fully known, and it is probable that multiple factors contribute to its development.

IC is characterized by chronic or remitting and recurring urinary symptoms. There is typically chronic urinary frequency and urgency which may significantly interfere with activities of daily living. Frequent nighttime urination causes sleep disruption that can lead to **fatigue** and **depression**.

Demographics

In the late 1990s between 500,000 and 1,000,000 cases of IC were reported in the United States. It is likely that prevalence of IC may be substantially greater than this due to the strict diagnostic criteria and many cases have gone undiagnosed.

Interstitial cystitis affects predominantly women, who comprise about 90% of cases. This may be in part because estrogen appears to play a role in the disorder. Women also have increased incidence of autoimmune conditions in general, and IC may have an autoimmune component.

Causes and Symptoms

The etiology of interstitial cystitis is largely theoretical and not well understood. It is likely a multifactorial condition with multiple causes. Research has confirmed several contributing aspects to the pathology of IC, including neurological, immunological, hormonal and structural origins.

The nervous system is involved in the pathology of interstitial cystitis as the site of neurogenic inflammation. Sensory nerves in the pelvis secrete immunological agents, causing inflammation and pain. One such agent is known as Substance P, a neuropeptide that acts to communicate a pain signal to the central nervous system, resulting in sensation of pain. Elevated levels of Substance P are found in patients with IC, contributing to the sensation of pelvic and bladder pain.

The immune system promotes neurogenic inflammation through chemical mediators such as substance P, inflammatory cytokines, and mast cells. Mast cells release histamine, an immune agent that promotes a local inflammatory response. In 30-65% of cases of IC, elevated mast cell levels were found in the bladder wall, contributing to chronic inflammation. It is suspected that there is autoimmune activity in IC, but studies have been inconclusive.

Estrogen plays a role in the etiology of IC, which may partially explain the higher incidence in women. Studies have shown that estrogen plays a role in determining the intensity of nerve inflammation. Symptoms are typically more severe in premenopausal women, especially at ovulation when estrogen levels peak.

As a result of chronic inflammation of the bladder wall, the mucosal lining of the bladder is compromised in IC. The surface layer of the bladder is comprised of glycosaminoglycans (GAGs) which protect the bladder from microorganisms, toxins and the acidity of the urine. In IC, the GAG layer is broken down, leading to increased permeability, inflammation and stimulation of pain receptors. IC is sometimes referred to as "leaky bladder syndrome," as the urine leaks through the protective membrane and irritates the deeper layers of the bladder.

Diagnosis

In 1987-88, the National Institutes of Health established a task force to define the diagnostic criteria of IC, which were revised in 1999 by the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). These criteria have also been critiqued as being too restrictive, resulting in underdiagnosis of interstitial cystitis by as much as 60%. In 2007, a Consensus Group on Interstitial Cystitis/Painful Bladder Syndrome met to discuss and further refine the definition of IC, also referred to as Painful Bladder Syndrome (PBS), to the following: "Pelvic pain, pressure, or discomfort related to the bladder, typically associated with persistent urge to void or urinary frequency, in the absence of infection or other pathology."

IC is a diagnosis of exclusion, meaning that other conditions must first be ruled out before a diagnosis of interstitial cystitis can be made. The conditions that must be ruled out include **pelvic inflammatory**

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disease, sexually transmitted disease, **bladder infection**, kidney or bladder stones and **bladder cancer**.

Interstitial cystitis is diagnosed based on history of symptoms for greater than nine months and absence of other diagnoses upon urological evaluation. The "gold standard" of diagnosis is cystoscopy with hydrodistention. This outpatient surgical procedure involves filling the bladder with fluid and viewing the bladder wall with a scope, under local anesthesia. This procedure will reproduce the sensation of intense urgency for urination, as well a diminished filling capacity. Cystoscopy often reveals pinpoint hemorrhages on the bladder wall called glomerulations, and more rarely reveals ulceration of the bladder lining known as Hunner's ulcers.

At this writing in 2008, additional testing had been developed to use potassium-chloride (KCl) to diagnose IC. Due to increased permeability of the bladder wall, **potassium** in the urine can pass through the bladder, provoking the inflammatory and pain reactions. The KCl sensitivity test utilizes an infusion of KCl through a catheter into the bladder to reproduce the symptoms. This test has been found to be about 60-75% accurate and is not yet approved for diagnosis.

Treatment

Conventional treatment includes the oral heparinoid compound pentosan polysulfate (PPS) and heparin injected to the bladder intravesically. PPS and heparin are similar in structure to the GAGs that regulate the permeability of the bladder surface. This form of treatment has found to be successful in clinical studies when used for at least one to two years. One study of long-term use of PPS oral therapy found that 65% of study participants found relief.

PPS and similar drugs may be used in conjunction with other medications that address the immunological and neurological components of IC, such as antihistamines and anti-depressants. Additional pharmacologic agents used for adjunct treatment are gabapentin, an antiepileptic drug, and in extreme cases, opioids for pain management.

Hydrodistention, the procedure for diagnosing IC, has been found to bring short-term relief for 3-6 months and is often used therapeutically. Other agents applied directly to the bladder include dimethyl sulfoxide (DMSO), which has been found to reduce inflammation and mastocytosis of the bladder. One study found 53% of participants reported improvement after treatment with DMSO.

Natural therapies are similarly selected to address the underlying mechanisms of interstitial cystitis. Oral supplementation of glycosaminoglycans such as **glucosamine** sulfate and **chondroitin** sulfate may help repair the GAG layer of the bladder and reduce leakage of potassium-containing urine through the protective surface. Glucosamine sulfate, chondroitin sulfate and other sulfate donors may act as sulfate donors for glycosaminoglycan repair. Sulfate is required for GAG synthesis and glucosamine increases serum sulfate concentrations.

The nutrients L-arginine and quercitin have been studied for their use in treating IC. L-arginine is an amino acid found to increase nitric oxide (NO) and its precursor nitric oxide synthase (NOS), which may be deficient in patients with IC, causing increased bladder irritability. Randomized clinical trials of L-arginine are conflicting, although it may decrease pain intensity, frequency and nighttime urination. Quercitin, a bioflavinoid, stabilizes mast cells and reduces histamine secretion. It has shown some promise in small studies for significantly decreasing pain, although further study is needed.

Botanical medicine can offer much relief to sufferers of interstitial cystitis. Botanicals that may be useful are demulcent herbs such as marshmallow (Althea officinalis) and couch grass (Agropyren repens). **Licorice** root (Glycerrhiza glabra) has both anti-inflammatory and demulcent properties, soothing irritated mucosa. Kava (Piper methysticum) is a well-known nervine botanical that alleviates inflammation and irritation of the urinary system as well as relieving neuralgic pain. Its use should be supervised by a practitioner knowledgeable about botanical medicine because although it is generally safe, long-term use has been associated with adverse liver effects.

Therapeutic **nutrition** is another consideration for IC treatment, particularly the identification and elimination of food sensitivities. Keeping a diet diary can help identify foods that aggravate IC symptoms, usually within 2-4 hours of ingestion. Inflammation may be reduced by following an anti-inflammatory diet, eliminating foods that promote inflammation such as wheat, dairy, soy, peanuts and nightshade vegetables such as peppers and tomatoes. Avoidance of **caffeine**, sugar and artificial sweeteners, alcohol, spicy and acidic foods, and food additives may reduce irritation to the bladder.

Hydrotherapy treatments such as sitz baths may help reduce inflammation and relieve pelvic pain, using alternating hot and cold water. This home treatment is done by using two large basins or tubs, one with hot water and one with cold (approximately 105° and 45°, respectively). The water should be deep enough to submerge the pelvis up to the navel when

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KEY TERMS

Cystoscopy—A procedure for examination of the interior of the bladder using an instrument introduced through the urethra into the bladder.

Cytokines—Produced by white blood cells, cytokines are chemical signalers that commune immunologic messages and direct specific immune responses.

Glycosaminoglycans—Any of a group of polysaccharides with high molecular weight that contain amino sugars and often form complexes with proteins.

Histamine— An amine acting as an immunologic agent or neurotransmitter, producing a range of responses including redness, flushing, inflammation and edema.

Hydrodistention—Filling the bladder with fluid for the purpose of examining the internal bladder with a cystoscope.

seated in the tub. Taking care not to get chilled, the bather first sits in the hot tub for 3-5 minutes, then moving to the cold tub for 30-60 seconds. This cycle can be repeated three times, always ending with the cold water bath.

Lastly, homeopathic remedies that are individually selected for the patient may improve the symptoms when used acutely for pain and discomfort. **Homeopathy** may also be used to improve the overall constitutional health, and is best used with the supervision of a skilled homeopath.

Prognosis

Many clinical trials of conventional treatments indicate at least marginal improvement with pharmacologic therapy. Fewer studies exist on the efficacy of nutritional or botanical therapeutics, although empirical evidence and some small clinical trials of various natural remedies brought about symptom relief and improved quality of life.

Prevention

As the etiology of IC is poorly understood, it is difficult to determine means of preventing its onset. One theory is that food **allergies** and sensitivities contribute the generalized inflammation and local irritation to the gut lining and may similarly affect the bladder. For this reason, identifying and removing food sensitivities may prevent the occurrence of IC or its worsening in individuals with mild pelvic and urinary symptoms.

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ORGANIZATIONS

Interstitial Cystitis Association, 110 North Washington Street, Suite 340, Rockville, MD 20850, 1-800-HELP ICA, ICAmail@ichelp.org

International Pelvic Pain Society, The, 100 E. Woodfield Rd #520, Schaumburg, IL 60173, Phone: (847) 517-8712, Fax: (847) 517-7229, Website: http://www.pelvicpain.org/

OTHER

NIDDK IC Booklet Website: http://www.niddk.nih.gov/health/urolog/pubs/cystitis/cystitis.htm

National Kidney & Urologic Diseases Clearinghouse Website: http://kidney.niddk.nih.gov/kudiseases/pubs/interstitialcystitis/index.htm

Diana Christoff Quinn, ND

Iodine

Description

Iodine is a trace mineral required for human life. Humans require iodine for proper physical and mental development. It affects cell respiration and metabolism,

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Recommended dietary allowance of Iodine

Age	mg/day
Children 0-6 mos.	110
Children 7-12 mos.	130
Children 1-3 yrs.	90
Children 4-8 yrs.	90
Children 9-13 yrs.	120
Adolescents 14-18 yrs.	150
Adults ≥ 19 yrs.	150
Pregnant women ≤ 18 yrs.	220
Pregnant women ≥ 19 yrs.	220
Breast feeding women ≤ 18 yrs.	290
Breast feeding women ≥ 19 yrs.	290

Foods that contain iodine	mcg
Seaweed, dried, 1 oz.	up to 18,000
Kelp, 1/4 cup wet (amount is highly variable)	415
Salt, iodized, 1 tsp.	400
Haddock, 3 oz.	104-145
Cod, 3 oz.	99
Salt, iodized, 1 g	77
Milk, 1 cup	55-60
Turkey breast, cooked, 3 oz.	34
Cottage cheese, 1/2 cup	25-75
Shrimp, 3 oz.	21-37
Egg, 1 large	19-29
Processed fish sticks, 1 piece	17
Tuna, canned, 3 oz.	17
Ground beef, cooked, 3 oz.	8

mcg = microgram

(Illustration by GGS Information Services. Cengage Learning, Gale)

proper functioning of nerves and muscles, differentiation of the fetus, growth and repair of tissues, and the condition of skin, hair, teeth, and nails. Iodine is also needed for the production of thyroid hormones. The thyroid (a small gland in the front of the neck), which contains 80% of the body's iodine pool, converts iodine into the thyroid hormones thyroxine (T_4) and triiodothyronine (T_3). These hormones are released into the bloodstream, controlling the body's metabolic rate.

General use

The recommended dietary allowance (RDA) for iodine was revised in 2001 by the Food and **Nutrition** Board of the Institute of Medicine, and the data is provided in the table in this entry. That standard differs for various ages and each sex and for pregnant and lactating women.

Estimates of the average daily intake of iodine for citizens of the United States and other countries around the world vary widely depending on a number of factors, one of which is geographical location. The most recent estimates for iodine intake in the United States range from about 200 mcg/day to 500 mcg/day, with the upper level reaching nearly 750 mcg/day in some parts of the country. According to the *Merck Manual of Diagnosis and Therapy*, less than 20 mcg per day of iodide results in iodine deficiency; iodide intake 20 times greater than the daily requirement (1.5 mg) results in chronic iodine toxicity.

Iodine is available from a variety of food sources, drugs, and most commercial vitamin preparations. Some seafood and sea vegetables provide good sources of dietary iodine: canned sardines, canned tuna, clams, cod, haddock, halibut, herring, lobster, oyster, perch, salmon, sea bass, and shrimp. Dulse, **kelp**, and seaweed are also sources of dietary iodine. If grown in iodine-rich soil, foods including asparagus, green peppers, lettuce, lima beans, mushrooms, pineapple, raisins, spinach, summer squash, Swiss chard, turnip greens, and whole-grain wheat may provide good sources of dietary iodine. Animal products can also provide a source of iodine, especially if the animals are fed iodine-enriched foods or salt: beef, beef liver, butter, cheddar cheese, cottage cheese, cream, eggs, lamb, milk, and pork. Some foods such as breads may contain iodine additives.

Another source of dietary iodine is iodized salt. Iodized table salt was introduced in the United States in 1924 and significantly reduced the incidence of iodine deficiency. Providing iodized salt licks for livestock adds iodine to animal products. In some parts of the world, iodized oil supplements and water iodination provide other means of iodine supplementation. In 2007, the Network for Sustained Elimination of Iodine Deficiency reported that 70% of the world's population had access to supplemental iodine in one form or another. Many countries, however, still have insufficient iodine supplementation programs.

Iodine has several medical applications. Typically, in conjunction with drug therapy, iodine may be used to treat goiter (an enlargement of the thyroid gland), symptoms of **hypothyroidism** (diminished production of thyroid hormone), and **hyperthyroidism** (increased production of the thyroid gland). It may also be used as an expectorant in **cough** medications. Applications of iodine to conditions such as arteriosclerosis, arthritis, and **angina** pectoris have also been noted. Iodine tinctures (dilute mixtures of alcohol and iodine) or a combination of Bacitracin **zinc** and Polymyxin B sulfate (Betadine) are used as antiseptics to kill bacteria in skin **cuts**. Atomidine, a product

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containing iodine trichloride and other unlisted ingredients, is also sold as an antiseptic. Atomidine taken orally in minute, cyclic doses is also recommended as a glandular stimulant and purifier.

Some research has shown that oral iodine supplements have antifibrotic and anti-inflammatory effects. Commonly reported studies have also suggested that iodine deficiency may be a factor in **fibrocystic breast disease** (FBD), a catch-all term that describes general, often normal, lumpiness of the breast. Clinical trials on women diagnosed with FBD found that, even in women showing normal thyroid function, thyroid hormone supplementation resulted in decreased breast **pain** and decreased breast nodules. Some early research also correlated higher incidence of breast, endometrial, and ovarian cancers with hypothyroidism and/or iodine deficiency. However, others have noted that low levels of **selenium**, which is more typically associated with **cancer**, were also present in these studies.

Iodine is used in several compounds for a variety of medical testing procedures. For example, it may be used in x-raying the gallbladder or kidneys or in cardiac imaging. It is used as a diagnostic tool to examine the thyroid gland's output. A common test measures thyroid radioactive iodine uptake (RAIU). Trace amounts of radioactive iodine (^{123}I or ^{131}I) are used to test thyroid function. Together with blood tests, examining how much iodine is taken up by the thyroid gland helps physicians diagnose hypothyroid conditions (when the thyroid takes up too little iodine) and hyperthyroid conditions (when it takes up too much). Radioactive iodine therapy is also used for treating thyroid disease and cancer. But radioactive iodine can cross the placenta, causing severe dysfunction and damage to the fetus's thyroid gland, so experts recommend that nursing mothers should discontinue nursing for a period of time after receiving test or treatment doses of radioactive iodine. Medical professionals may also prescribe low iodine **diets** in combination with radioactive iodine tests or treatments.

Precautions

Too much or too little iodine intake results in a wide spectrum of disorders that are addressed by adjusting iodine intake. Too much iodine can result in toxicity.

Iodine deficiency disorders (IDDs) are preventable, but not curable, by ensuring adequate iodine intake. Only a small amount of iodine is required over the human lifespan. The body, however, does not store iodine for long periods so the intake must be regular. Too little iodine intake can result in cold feet; **fatigue**; **insomnia**; problems with skin, nails, and hair; and weight gain. Goiter can result from iodine deficiency. Certain substances called goitrogens can also induce goiter by interfering with thyroid functioning. Some foods have goitrogenic tendencies, as do certain drugs, for example, thiourea, sulfonamides, and antipyrine. Foods containing substances that can prevent the utilization of iodine when eaten in large quantities include brussels sprouts, cabbage, cauliflower, kale, millet, mustard, peaches, peanuts, pears, pine nuts, soybeans, and turnips. Limiting consumption of these foods may be recommended for persons with an underactive thyroid.

Iodine deficiency can also result in serious, irreversible disorders, widely recognized as a serious global health problem by organizations such as the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF). According to the International Council on Control of Iodine Deficiency Disorders (ICCIDD), IDDs are the most common cause of preventable brain damage and mental retardation worldwide. IDD results in cretinism (a form of stunted growth) and problems in movement, speech, and hearing. A pregnant woman with an iodine deficiency risks miscarriage, stillbirth, and mental retardation of her baby. In 2006, WHO estimated that at least 800 million people worldwide live in environments that are deficient in iodine, placing them at serious risk for IDDs. In 2002, the United Nations Children's Fund announced a pledge to eliminate iodine deficiency in the world by 2005, citing the problem as a major cause of mental and learning disabilities. The 2005 goal turned out to be overly optimistic, although the effort to reduce iodine deficiency problems around the world, later called the Iodine Network, continued in operation in the late 2000s.

Side effects

Excess iodine is typically excreted, and output can be measured in the urine. Regular excessive iodine intake is needed for toxicity. Excess iodine, when used as a supplement or in drug therapy, may reduce thyroid function. Although more commonly associated with iodine deficiency, goiter can also result from too much iodine due to thyroid hyperactivity. Additionally, high amounts of iodine from sources such as overuse of iodized salt, vitamins, cough medications, kelp tablets, or from medical testing can cause effects, including rapid pulse, nervousness, headaches, fatigue, a brassy taste in the mouth, excessive salivation, gastric irritation, and hypothyroidism. **Acne** can appear or become worse. Some iodine-sensitive individuals may have an allergic reaction to iodine, often a skin rash. A physician may recommend

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that high iodine foods be removed from the diet of those who are iodine-sensitive. Similar side effects have also been observed in some women participating in studies on iodine and diagnosed FBD. Radioactive iodine has been implicated in producing thyroid dysfunction and thyroid cancer.

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ORGANIZATIONS

Iodine Network, 180 Elgin St., Suite 1000, OttawaON, Canada, K2P 2K3, +1 (613) 782-6812, http://www.iodinenetwork.net/.

U.S. Fund for UNICEF, 125 Maiden Lane, New York, NY, 10038, (800) 4UN-ICEF, http://www.unicefusa. org/.

World Health Organization (WHO), Avenue Appia 20, 1211, Geneva, 27, Switzerland, +41 22 791 2111, http://www.who.int/en/.

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Ipecac

Description

There are two categories of ipecac preparations—a syrup used in standard medical practice and a homeopathic remedy. They are given for different purposes. The medicinal effects of ipecac were recognized centuries ago by the Portuguese who settled in South America. They found a plant that can make people vomit and appropriately named it *Caephalis ipecacuanha*, meaning sick-making plant. Nowadays, ipecac is used to treat a variety of conditions. Its most widely accepted use is to induce **vomiting** in cases of accidental poisoning. When ipecac is swallowed, a substance in it called cephaeline irritates the stomach and causes vomiting. Syrup of ipecac is now considered the safest drug to treat poisoning and is often the most effective. There are different types of ipecac preparations that vary greatly in strength. Syrup of ipecac is best for use at home to treat accidental poisoning. Ipecac fluid extract and ipecac tincture should be avoided as they are much stronger compounds and can be toxic.

Ipecacuanha is a homeopathic remedy made from ipecac by a process of dilution and succussion (shaking). In contrast to syrup of ipecac, it is given to relieve vomiting.

General use

Treatment of poisoning

Standard medical practice uses ipecac to cause vomiting in cases of poisoning in order to remove the toxic substance from the stomach before absorption occurs. It can be used on animals as well as humans. Ipecac is safer and more effective than many other methods for inducing vomiting, such as sticking a finger down a child's throat or using salt water. There are times, however, when ipecac should not be used because it can make certain kinds of poisoning worse. Syrup of ipecac should not be used if the poison is one of the following.

- strychnine
- alkalis (lye)
- strong acids
- kerosene
- fuel oil
- gasoline
- coal oil
- paint thinner
- cleaning fluid

Poisoning is a potentially serious condition. It is best to contact a local poison control center, local hospital emergency room, or the family doctor for instructions before using syrup of ipecac.

Ipecac's reputation for inducing vomiting has encouraged some bulimics to take it on a regular basis

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KEY TERMS

Bulimia nervosa—An eating disorder characterized by episodic binge eating followed by self-induced vomiting or laxative abuse.

Cephaeline—A chemical compound found in ipecac that irritates the stomach lining and triggers the vomiting reflex.

Fluid extract—A concentrated preparation of a drug.

Law of similars—A principle of homeopathic treatment according to which substances that cause specific symptoms in healthy people are given to sick people with similar symptoms.

Modality—A factor or circumstance that makes a patient's symptoms better or worse. Modalities include such factors as time of day, room temperature, the patient's level of activity, sleep patterns, etc.

Tincture—An alcoholic solution of a chemical or drug.

in order to purge the contents of the stomach after an eating binge. This misuse of ipecac is extremely dangerous; it can cause heart problems, tears in the esophagus or stomach lining, vomiting blood, seizures, or even death.

Homeopathy

The homeopathic remedy made from ipecac is called *Ipecacuanha*. Homeopathic preparations are given for a reason completely opposite from that of standard allopathic treatment. In **homeopathy**, ipecac is given to stop vomiting rather than to induce it. According to Hahnemann's law of similars, a substance that would cause vomiting in large doses when given to a healthy person will stimulate a sick person's natural defenses when given in extremely diluted and carefully prepared doses. *Ipecacuanha* is a favorite homeopathic remedy for **morning sickness** associated with **pregnancy**. It is also given to stop **nausea** that is not relieved by vomiting; when the vomitus is slimy and white; when there is gagging and heavy salivation; when the tongue is clean despite the patient's feelings of nausea; and when the patient is not thirsty. The nausea may be accompanied by a **headache**, **cough**, or heavy menstrual bleeding. The modalities (circumstances) that suggest *Ipecacuanha* as the appropriate homeopathic remedy is that the patient feels worse lying down; in dry weather; in winter; and when exercising or moving about.

A homeopathic practitioner would not necessarily prescribe ipecac for all cases of nausea. *Arsenicum* would be given when the nausea is caused by **food poisoning** and accompanied by strong thirst, ***Nux vomica*** when the nausea is the result of overindulgence in food or alcohol and accompanied by **gas** or **heartburn**. A sick child might be given *Pulsatilla*, particularly if rich foods have been eaten.

On the other hand, a homeopathic practitioner may prescribe ipecac for any of the following conditions that are not related to nausea and vomiting.

- Nosebleeds producing bright red blood.
- Dental bleeding.
- Diarrhea with cramping abdominal pain. The stools are green with froth or foam.
- Asthma of sudden onset. The patient has to sit up in order to breathe, but cannot bring up any mucus in spite of violent coughing.
- Hoarseness or loss of voice following a cold.
- Physical or mental exhaustion.

Preparations

Syrup of ipecac

Syrup of ipecac is made from the dried roots and rhizomes (underground stems) of *Cephaelis ipecacuanha*. It is available over the counter in 0.5–1 oz bottles. Larger bottles require a doctor's prescription. The dosage for infants under 6 months old should be prescribed by the family doctor or poison control center. For children six months to one year, the usual dose is 5–10 ml or 1–2 tsp. One-half or one full glass (4–8 oz) of water should be taken immediately before or after the dose. The dose may be repeated once after 20–30 minutes if vomiting does not occur. For children one to 12 years of age, the usual dose is 15 ml (1 tbsp) to be taken with one full glass (8 oz) of water. Adults and teenagers should take 15–30 ml of ipecac with at least 1 full glass of water. Syrup of ipecac should not be taken with milk or soda drinks as these foods may prevent it from working properly. If vomiting does not occur within 20–30 minutes after the first dose, a second dose may be needed. If the second dose fails to induce vomiting, the patient should be taken to a hospital emergency room.

If both **activated charcoal** and syrup of ipecac are recommended to treat poison, ipecac must be used first. Activated charcoal should not be taken until 30

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minutes after taking syrup of ipecac, or until the vomiting caused by ipecac stops.

Homeopathic preparations

Ipecacuanha is available as an over-the-counter remedy in 30x potency. This is a decimal potency, which means that one part of ipecac has been mixed with nine parts of alcohol or water; 30x means that this decimal dilution has been repeated 30 times. The dilute solution of ipecac is then added to sugar tablets so that the remedy can be taken in tablet form.

Precautions

Syrup of ipecac

For inducing vomiting in cases of accidental poisoning, only the syrup form of ipecac should be used. Syrup of ipecac should not be mixed with milk or carbonated drinks as they may prevent vomiting. If syrup of ipecac is not immediately available in the home, it generally cannot be used. A 2002 report studied parents' attempts to administer the syrup upon calling a poison center when they felt they could obtain it within 15 minutes. However, actual time to administration was generally closer to 30 minutes and the report recommended that parents not be referred to purchase ipecac when their children have ingested a significant amount of a poisonous substance and the syrup is not already available in the home.

Syrup of ipecac should not be used in the following situations (contact poison control center or family doctor for alternative treatments).

- Poisoning caused by strychnine; sustained-release theophylline; such corrosive substances as strong alkalis (lye); strong acids (such as toilet bowl cleaner); and such petroleum products as kerosene, gasoline, coal oil, fuel oil, paint thinner, or cleaning fluids.
- Overdoses of medications given for depression.
- Excessive vomiting.
- A serious heart condition.
- Timing. Do not give ipecac more than 4–6 hours after the poison was ingested.
- Pregnancy.
- Very young children (less than six months old). Infants and very young children may choke on their own vomit or get vomit into their lungs.
- Drowsy or unconscious patients.
- Seizures.

Homeopathic preparations

Ipecacuanha should not be given after *Arsenicum* or *Tabac* because these remedies will counteract it.

Side effects

The following side effects have been associated with the use of syrup of ipecac.

- Loose bowel movements.
- Diarrhea.
- Fast irregular heartbeat.
- Inhaling or choking on vomit.
- Stomach cramps or pains.
- Coughing.
- Weakness.
- Aching.
- Muscle stiffness.
- Severe heart problems often occur in cases of ipecac abuse. Because ipecac stays in the body for a long time, damage to the heart frequently occurs in persons who repeatedly take ipecac to induce vomiting.
- Seizures. These are most likely to occur in patients who accidentally swallow ipecac or in ipecac abusers.
- Death. Deaths have been reported due to ipecac abuse in bulimic persons.

Homeopathic *Ipecacuanha* has been highly diluted and is relatively nontoxic.

Interactions

Ipecac should not be given with other drugs because it can decrease their effectiveness and increase their toxicity. If both syrup of ipecac and activated charcoal are needed to treat suspected poisons, ipecac should be given first. Activated charcoal should not be given until vomiting induced by ipecac has stopped. Soda should also be avoided because it can cause the stomach to swell. The person should lie on the stomach or side in case vomiting occurs.

Homeopathic *Ipecacuanha* is considered complementary to *Arnica* and *Cuprum*. It is counteracted by *Arsenicum* and *Tabac*.

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ORGANIZATIONS

American Foundation for Homeopathy. 1508 S. Garfield. Alhambra, CA 91801.

Homeopathic Educational Services. 2124B Kittredge St. Berkeley, CA 94704. (510) 649-0294. Fax: (510) 649-1955.

Mai Tran
Teresa G. Odle

Ipraflavone *see* **Ipriflavone**

KEY TERMS

Calcitonin—A hormone that inhibits bone resorption in response to high blood levels of calcium.

Daidzein—A soy isoflavone used to produce ipriflavone.

Genistein—A plant isoflavone, found as genistin in soy, that is used to produce ipriflavone.

Isoflavones—Compounds, including plant estrogens, with two phenolic rings, that are found in significant quantities in soybeans and soy foods. Isoflavones belong to the larger category of flavonoids, plant compounds that are often a source of the plant fruit or flower color, and possess anticancer, anti-inflammatory, anti-allergy, and antioxidant qualities.

Menopause—The cessation of menstruation.

Osteoporosis—A progressive disease characterized by loss of bone density and increased bone fragility.

Resorption—The dissolution of bone tissue.

Ipriflavone

Description

Ipriflavone (IP), also called ipraflavone, is a mass-produced synthetic derivative of genistein (genistin) or daidzein. Genistein and daidzein are unique plant compounds called isoflavones, which are primarily found in soy products. Isoflavones belong to a larger category known as flavonoids, which are natural plant components that have antioxidant, anti-inflammatory, anti-allergy, and anticancer properties. Although most soy isoflavones are classified as plant estrogens (phytoestrogens), ipriflavone does not have estrogenic activity, and does not activate any estrogen receptors in the body. However, it may prevent or treat bone loss—osteoporosis—associated with **menopause** (the cessation of **menstruation**) and **aging**.

Ipriflavone contains three carbon rings. Its chemical names are:

- 7-isopropoxyisoflavone
- 7-isopropoxy-3-phenyl-4H-1-benzopyran-4-one
- 7-(1-methylethoxy)-3-phenyl-4H-1-benzopyran-4-one
- 7-isopropoxy-3-phenylchromone

One source notes that ipriflavone is found in foods, but only in trace amounts. In addition to soy products (including some soy sauces), trace amounts are found in **alfalfa** and other foods. It also is found in propolis, a resin that bees collect from tree buds for use as a hive cement. Ipriflavone is a solid that dissolves only slightly in water.

The liver metabolizes ipriflavone into 7-hydroxy-ipriflavone and 7-(1-carboxy-ethoxy)-isoflavone. IP and its derivatives are bound to albumin, a blood protein, and distributed to tissues throughout the body.

Ipriflavone may be one of the best-studied compounds in the natural health industry. However, the results of these studies are not clear with regard to efficacy in increasing bone density, its primary claim. Ipriflavone was first isolated at a Hungarian pharmaceutical company in 1969. Since the 1980s, it has been a registered prescription drug for the prevention and treatment of **osteoporosis** in Japan, Argentina, and Europe.

General use

Like other cells in the human body, bone cells are constantly being replaced. Furthermore, bones serve as a **calcium** bank because they are a source of calcium used for other functions, such as buffering the blood. Osteoporosis is a net loss of bone mass, caused either by excessive bone-resorping (dissolving) or low bone-forming activities. These activities are often related to the increased bone turnover rate that accompanies menopause.

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Women have a lifetime risk of 40% for developing osteoporosis. One-half of all women over the age of 50 will develop the disease. One in eight men experience bone **fractures** as a result of osteoporosis. Hip fractures caused by osteoporosis are a direct or indirect cause of death in one-quarter of elderly Americans. Bone building and breakdown are influenced by the following:

- hormones, including estrogen and calcitonin (from the parathyroid gland)
- minerals such as magnesium, phosphorus, boron, zinc, silica, and vanadium
- vitamins, including vitamin D.
- other factors such as corticosteroid use, sunlight, dietary acidity, physiologic pH, and overall bodily health

Numerous studies have indicated that ipriflavone maintains or increases bone mineral density in osteoporosis, particularly in conjunction with calcium supplementation. Clinical studies have demonstrated that ipriflavone supplementation may:

- prevent rapid bone loss immediately following menopause
- increase bone density in postmenopausal women by as much as 3%
- increase bone mineral density in women with osteoporosis by up to 6%
- decrease the incidence of bone fractures among postmenopausal women
- reduce bone pain caused by osteoporosis
- increase mobility in women with osteoporosis
- stimulate the synthesis and secretion of calcitonin, a hormone that controls calcium metabolism
- lower the high cholesterol levels associated with menopausal estrogen deficiency
- have some activity against cancer

Ipriflavone also slows bone loss in women whose ovaries have been removed, although it does not appear to prevent acute bone loss immediately following ovariectomy. Further studies in this area have not obtained the same conclusions, except under very specific conditions including younger age and active bone loss. Therefore, the presence of osteoporosis alone does not appear to be sufficient for obtaining good results, even with calcium supplementation.

The mechanisms of ipriflavone activity are not understood. *In vitro* and animal studies have indicated that:

- Genistein inhibits the breakdown of bone.
- Ipriflavone inhibits bone resorption (the breakdown and recycling of bone tissue).
- Ipriflavone may stimulate bone formation.

In contrast, one large study of postmenopausal women with slight osteoporosis found no significant bone density changes between the group taking calcium supplements alone and those taking calcium plus ipriflavone.

Since ipriflavone does not have estrogenic activity, it may be appropriate for treating bone loss in men, particularly in those with **prostate cancer** who are receiving therapies that reduce androgen (masculinizing hormone) levels.

Preparations

Ipriflavone is available over-the-counter (OTC) in many generic and brand name forms (e.g. Ostivone, Natrol, and Bone Support Ipriflavone Blend). It is supplied in capsules, each containg 100, 200, or 300 mg. A typical IP dose for the management of osteoporosis is 200 mg, two to three times daily. Almost all studies consistently used 600 mg daily. A two-month supply costs about $20.

Food items, particularly those containing lipids, increase the small intestine's absorption of ipriflavone. IP supplements are more effective if combined with calcium and other supplements that help to diminish bone loss during menopause and aging. Ipriflavone sometimes is combined with low-dose estrogen preparations.

Natural isoflavone supplements isolated from soy do not appear to have the same benefits or phytoestrogen neutral qualities as ipriflavone.

Precautions

Ipriflavone has not been subjected to long-term safety studies. In one study, a consistent precaution resulting from research that spanned as much as three years, is that ipriflavone appears to decrease lymphocyte (disease-fighting white-blood-cell) levels in a significant number of postmenopausal women with minor osteoporosis. Additionally, since ipriflavone is metabolized by the liver, those with liver disease are advised to avoid it unless directed otherwise by a healthcare professional. Other contraindications include **pregnancy** and breast-feeding, gastric or duodenal ulcers, and kidney disease. Ipriflavone is not recommended for small children.

Side effects

No significant side effects have been observed with ipriflavone, although there are reports of **heartburn**, **nausea**, **diarrhea**, or other mild gastrointestinal disturbances. These side effects may be avoided by

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taking the supplement with food. One source noted that the percentage of perceived side effects was actually less among the IP users than in the placebo group. Generally, ipriflavone is considered to be well tolerated, to have no effect on fertility, and to not promote precancerous cellular changes (mutagenicity). Approximately 13% of women studied had a decrease in white blood cell count, usually within the first six months. However, this group did not become more susceptible to disease or illness. Their normal white blood cell counts returned within one to two years of discontinuing the IP. There were occasional reports of hypersensitivity reactions, and increases in liver function test scores.

Interactions

Similar to grapefruit juice, IP has an inhibiting effect on a liver **detoxification** pathway involving an enzyme known as cytochrome P450. This effect increases both the blood levels and the effects of these drugs:

- theophylline: IP and 7-hydroxy-ipriflavone may inhibit the metabolism and elimination of this asthma drug, leading to elevated—and potentially toxic—blood levels
- zafirlukast (Accolate), an asthma medication
- antipsychotic medications
- caffeine
- celecoxib (Celebrex), a pain reliever for arthritis
- cyclobenzaprine (Flexeril), a muscle relaxant
- nifedipine
- nonsteroidal anti-inflammatory medications and pain relievers
- tacrine (Cognex), a medication for Alzheimer's disease
- tamoxifen (Nolvadex), for cancer prevention and treatment
- tolbutamide, levels are increased by both ipriflavone and 7-hydroxy isoflavone
- warfarin (Coumadin), a blood-thinner

The effects of ipriflavone may be additive with the effects of these drugs:

- bisphosphonates, for the treatment of osteoporosis
- calcitonin
- estrogen
- selective estrogen receptor modulators (SERMs)

During the management of osteoporosis, ipriflavone effects may be additive with the effects of the following nutritional supplements:

- boron
- calcium
- fluoride
- vitamin D
- vitamin K

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Margaret Alic

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Iridology

Definition

Iridology, also called iris analysis or iris diagnosis, is the study of the iris (the colored part of the eye). Iris "readings" are made by iridologists to assess a person's health picture (physical, emotional, mental, and spiritual) and guide them to take measures to improve their health.

Origins

The basic concept of iridology has existed for centuries. The medical school of the University of Salerno in Italy offered training in iris diagnosis. A book published by Philippus Meyers in 1670, called *Chiromatica medica*, noted that signs in the iris indicate diseases. Dr. Ignatz von Peczely, however, is generally considered the father of iridology, with the date of his discovery given as 1861. Von Peczely was a Hungarian physician. As a child, he accidentally broke an owl's leg. He observed that a black line formed in the owl's lower iris at the time of the injury. After the owl's leg healed, the young von Peczely noted that the black streak had changed appearance. As a physician, he treated a patient with a broken leg in whose eye he observed a black streak in the same location as on the injured owl's iris. Von Peczely became intrigued by the possibility of a connection between diseases and eye markings. Through observing his patients' eyes, he became convinced of this connection and developed a chart that mapped iris-body correlations. After several decades of comparative study, von Peczely mapped organs across zones identified by hours and minutes on a clock face superimposed over drawings of the eyes. In 1881, he published his theories in a book called *Discoveries in the Field of Natural Science and Medicine: Instruction in the Study of Diagnosis from the Eye*.

A Swedish pastor and homeopath named Nils Liljequist also developed the concept of iris-body correlations at roughly the same time but independently of von Peczely's work. He was the first iridologist to identify the effects of such drugs as **iodine** and quinine on the iris. Liljequist based his initial observations on changes in his own irises after illnesses and injuries, publishing writings and eye drawings during the late nineteenth century. One of his students, Dr. Henry Lahn, brought the practice of iridology to the United States. A variety of practitioners, primarily European, have sought to popularize iridology since these early works. Dr. Bernard Jensen, a chiropractor, is the best-known contemporary American advocate of iridology.

Benefits

Iridologists claim that by studying the patterns of a person's iris, they can provide helpful and accurate health and wellness information. Iridology is a holistic endeavor in that it addresses the person's whole being in the reading. The range of information gleaned encompasses physical, emotional, mental, and spiritual aspects of the person's health picture. In addition to assessing the person's general level of health, readings can reveal other data, including energy quotients; internal areas of irritation, degeneration, injury, or inflammation; nutritional and chemical imbalances; accumulation of toxins; life transitions; and subconscious tensions. Iridologists maintain that the eyes reveal information about the person's physical and emotional constitution, such as inherited weaknesses and risks to which the person may be prone. Strengths may also be revealed, including inherited emotional tendencies from which the person derives particular talents. Cleansing and healing can be verified by changes in the iris. By looking for certain signs such as healing lines, iridologists obtain information about previous health problems and injuries and discover what may have gone wrong in the person's past.

An iridology reading reflects the causes of problems, not symptoms. It may, iridologists claim, reveal that organs or systems are overstressed or predisposed to disease before clinical symptoms even develop. By predicting future problems, iridology can be used as a preventive tool. People can use the information from iridology readings to improve their health and make better behavioral choices in the future, thereby heading off problems before they occur.

In North America, iridology is generally considered to be an assessment tool to be used in cooperation with other health specialties. Iridology is not a diagnostic tool (although it is more likely to be considered so by European iridologists) and should not be used to diagnose or name specific diseases. Not only would diagnosis represent an improper application of iridology according to many iridologists, as noted by the International Iridology Research Association (IIRA), it could also be construed in many countries as practicing medicine without a license.

Description

Iridology is generally based on the concept of neural pathways between the body and the iris. Although iridologists may differ on the exact mechanism, most maintain that the iris reflects what is happening throughout the body via nerve conduction from all parts of the body to the eye. The client's health

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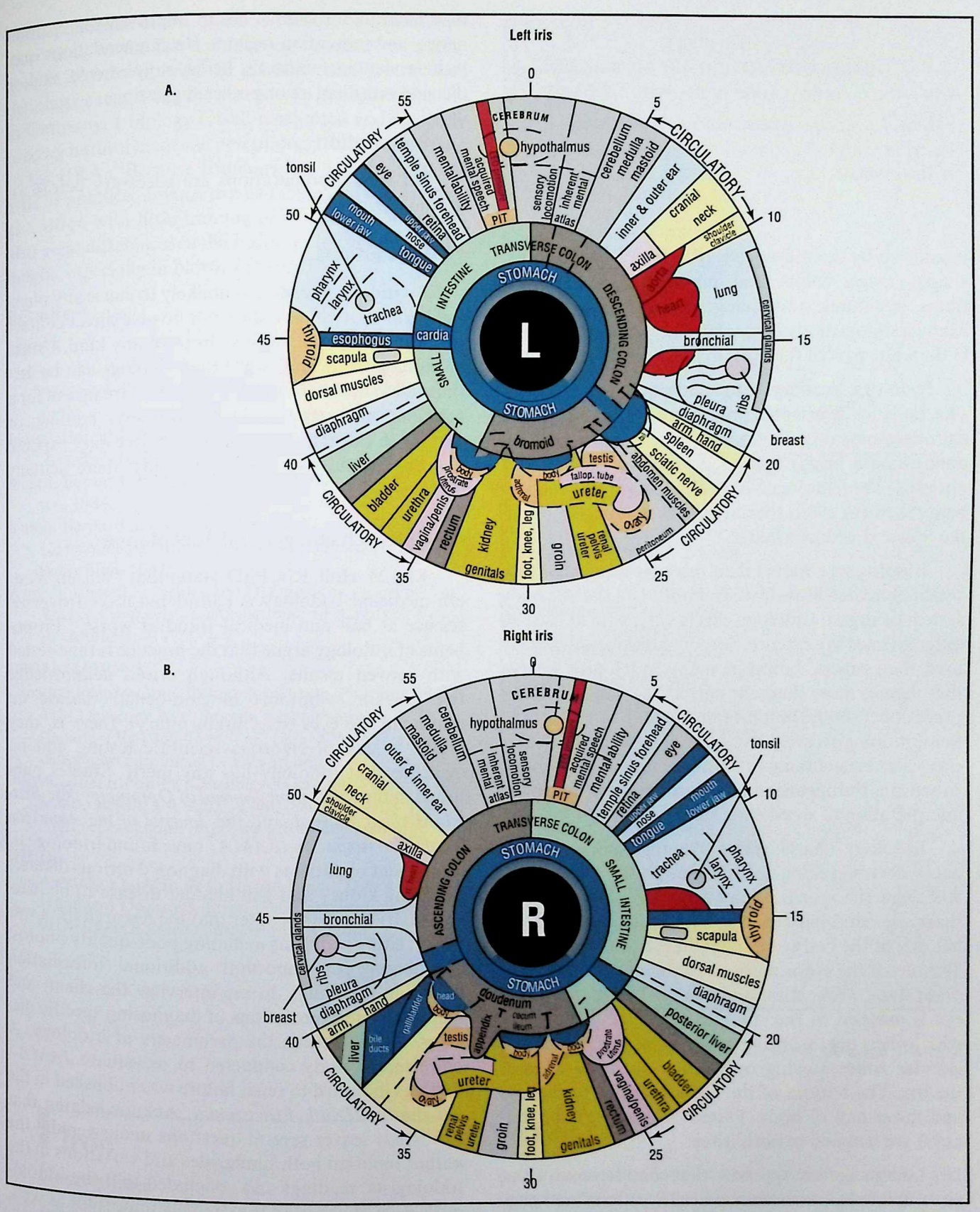

Iridology charts for left and right irises. *(Illustration by GGS Information Services, Inc. Cengage Learning, Gale)*

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KEY TERMS

Iris—The colored portion of the eye.

Sclera—A dense white fibrous membrane that, together with the cornea, forms the outer covering of the eyeball.

is assessed by the iridologist, who interprets patterns, shapes, rings, colors and pigmentation markings, fibers, structures, and changes in the pupil and iris. Many iridologists also use sclerology (reading the lines in the white part of the eyes) in their health evaluation.

Iridology readings are typically performed by such holistically oriented practitioners as naturopaths, chiropractors, or nutritionists. The reading may be done using a bright light, a magnifying glass, and a notepad. The iridologist may also use various tools to better view the eye, a special camera to take pictures of the iris, and/or a computer.

Iridologists conduct their readings using charts on which each area of the iris is mapped to a specific body system or organ. Iridology charts vary, with at least 20 different ones in existence. Some charts are more widely used than others; however, many iridologists believe that there is more than one correct map and that each practitioner should become familiar with several charts. Some iridologists even develop their own charts. Differences also exist among practitioner techniques; among American, European, and other approaches; and in the interpretation of specific iris signs.

Iridology charts divide the iris into numerous zones corresponding to different parts of the body. Although the specifics may differ on each chart, all share a general pattern. The left eye is mapped to the left side of the body and the right eye to the right side. The top of the eye is mapped to the upper body (e.g., brain, face, neck, chest and heart). The center of the eye is mapped to the stomach and digestive organs, with other organs being represented by concentric circular zones moving outward toward the edge of the iris. The bottom of the eye is mapped to the legs and lower half of body. Paired organs (e.g., the kidneys) are mapped to both irises.

Using a holistic approach that considers each client as an individual with unique health patterns and concerns, behaviors, and experiences, the iridologist will examine the eyes and make a health assessment. Based on the results of that reading, the iridologist generally recommends a wellness program tailored to the individual's physical, emotional, and life situation. This program may incorporate various health improvement, maintenance, and prevention regimes. Recommendations may include vitamins, minerals, herbs, supplements, and/or diet and **nutrition**, among other suggestions.

Preparation

No special preparations are necessary before an iridology reading.

Precautions

An iridology reading is unlikely to cause any physical harm by itself, as it does not involve direct contact with the eye or applying eye drops of any kind. Critics of iridology, however, argue that iridology can be detrimental to health if a sick person delays treatment for a condition not suggested by the iridology reading; or that it can can cause anguish and unnecessary expense if a reading suggests a problem when there actually is none.

Research and general acceptance

Rita M. Holl, RN, PhD, states that "Within Western medicine, iridology is considered a controversial science at best and medical fraud at worst." Proponents of iridology argue that the practice is time-tested with proven results. Although critics acknowledge that certain symptoms of non-ocular disease do appear in the eyes (e.g., brain injury), there is, they argue, a lack of rigorous scientific testing and no evidence that iridology has any merit. Studies published in the *Australian Journal of Optometry*, the *British Medical Journal*, and the *Journal of the American Medical Association (JAMA)* have found iridologists' assessment of patients with diagnosed serious diseases including kidney and gall bladder disease to be inaccurate. Iridologists counter that the research itself was faulty, citing problems including poor-quality photos; the absence of important additional information including the ability to see/interview the client; and inappropriate expectations of diagnosing specific diseases, a task outside the parameters of iridology. A more recent study conducted to reevaluate *JAMA's* findings in regard to renal failure was published in the *Alternative Health Practitioner*. Acknowledging that the "study leaves several questions unanswered," the author reported both similarities and variations in the iridologists' readings and concluded that the iridologist's level of expertise is extremely important as well.

Training and certification

Iridologists receive training from various sources. They may learn their trade through books, tapes,

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correspondence courses, online classes, or live classes. According to the IIRA, "Iridology operates in a gray area in North America. In general, there are no laws defining or regulating the practice. In Europe, especially in Germany, Iridology is well recognized and routinely used by natural medicine practitioners." Also according to the IIRA, "Because Iridology has no official standards of practice, anyone can call themselves an Iridologist, often with little training or experience. There are also great differences in the Iridology information being taught, especially in North America."

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Canadian Neuro-Optic Research Institute. P.O. Box 29053. 4324 Dewdney Ave. Regina, Saskatchewan S4T 7X3. Canada. (306) 359-7694. Fax: (306) 525-2659. cnricontacts@cnri.edu. http://www.cnri.edu/.

International Iridology Research Association. PO Box 1442. Solano Beach, CA 92075-2208. (888) 682-2208. IIRAOffice@aol.com. http://www.iridologyassn.org/.

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Quackwatch: Your Guide to Health Fraud, Quackery, and Intelligent Decisions. http://www.quackwatch.com/01QuackeryRelatedTopics/iridology.html.

Kathy Stolley

Recommended dietary allowance of iron

Age	mg/day
Children 0-6 mos.	0.27
Children 7-12 mos.	11
Children 1-3 yrs.	7
Children 4-8 yrs.	10
Children 9-13 yrs.	9
Boys 14-18 yrs.	11
Girls 14-18 yrs.	15
Men 19-50 yrs.	8
Women 19-50 yrs.	18
Adults ≥ 51 yrs.	8
Pregnant women	27
Breastfeeding women ≤ 18 yrs.	10
Breastfeeding women ≥ 19 yrs.	9

Foods that contain heme iron	mg
Chicken liver, cooked, 3 oz.	12.8
Oysters, 6 med	5.04
Beef, cooked, 3 oz.	3.2
Turkey, light meat, cooked, 3 oz.	2.3
Shrimp, cooked, 8 large	1.36
Tuna, light, canned, 3 oz.	1.3
Chicken, dark meat, cooked, 3 oz.	1.13
Halibut, cooked, 3 oz.	0.9
Crab, cooked, 3 oz.	0.8
Pork loin cooked, 3 oz.	0.8

Foods that contain nonheme iron	mg
Cereal, 100% iron fortified, 1 cup	18
Soybeans, boiled, 1 cup	8.8
Tofu, firm, 1/2 cup	6.22
Beans, kidney, cooked, 1 cup	5.2
Beans, lima, cooked, 1 cup	4.5
Beans, pinto, cooked, 1 cup	3.6
Blackstrap molasses, 1 tbsp.	3.5
Potato, med. with skin	2.75
Cashew nuts, 1 oz.	1.70
Bread, whole wheat, 1 slice	0.9
Raisins, small box, 1.5 oz.	0.89

mg = milligram

(Illustration by GGS Information Services. Cengage Learning, Gale)

Iron

Description

Iron is a mineral that the human body uses to produce the red blood cells (hemoglobin) that carry oxygen throughout the body. It is also stored in myoglobin, an oxygen-carrying protein in the muscles that fuels cell growth.

General use

Iron is abundant in red meats, vegetables, and other foods. A well-balanced diet can usually provide an adequate supply of the mineral, but when there is insufficient iron from dietary sources or as a result of blood loss in the body, the amount of hemoglobin in the bloodstream is reduced and oxygen cannot be efficiently transported to tissues and organs throughout

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the body. The resulting condition, iron-deficiency **anemia**, is characterized by **fatigue**, shortness of breath, pale skin, concentration problems, **dizziness**, a weakened immune system, and energy loss.

Iron-deficiency anemia can be caused by a number of factors, including poor diet, heavy menstrual cycles, **pregnancy**, kidney disease, **burns**, and gastrointestinal disorders. Individuals with iron-deficiency anemia should always undergo a thorough evaluation by a physician to determine the cause.

Children two years old and younger also need adequate iron in their **diets** to promote proper mental and physical development. Children under two who are not breastfeeding should eat iron-fortified formulas and cereals. Women who breastfeed their babies need at least 15 mg of dietary or supplementary iron a day in order to pass along adequate amounts of the mineral in their breast milk. Parents should consult a pediatrician or other healthcare professional for guidance on iron supplementation in children.

Some authorities have theorized that excess stored iron can lead to **atherosclerosis** and ischemic **heart disease**. Phlebotomy, or blood removal, has been used with some success to reduce stored iron in patients with iron overload. Iron chelation with drugs such as desferrioxamine (Desferal) that help patients excrete excess stores of iron can be used in treating iron overload caused by multiple blood transfusions.

Iron levels in the body are measured by both hemoglobin and serum ferritin blood tests.

Normal total hemoglobin levels are:

- neonates: 17–22 g/dL
- one week: 15–20 g/dL
- one month: 11–15 g/dL
- children: 11–13 g/dL
- adult males: 14–18 g/dL (12.4–14.9 g/dL after age 50)
- adult females: 12–16 g/dL (11.7–13.8 g/dL after menopause)

Normal serum ferritin levels are:

- neonates: 25–200 ng/mL
- one month: 200–600 ng/mL
- two to five months: 50–200 ng/mL
- six months to 15 years: 7–140 ng/mL
- adult males: 20–300 ng/mL
- adult females: 20–120 ng/mL

Preparations

Iron can be found in a number of dietary sources:

- pumpkin seeds
- dried fruits (apricots)
- lean meats (beef and liver)
- fortified cereals
- turkey (dark meat)
- green vegetables (spinach, kale, and broccoli)
- beans, peas, and lentils
- enriched and whole grain breads
- molasses
- sea vegetables (blue-green algae and kelp)

Eating iron-rich foods in conjunction with foods rich in **vitamin C** (such as citrus fruits) and lactic acid (sauerkraut and yogurt) can increase absorption of dietary iron. Cooking food in cast-iron pots can also add to their iron content.

The recommended dietary allowances (RDA) of iron as outlined by the United States Department of Agriculture (USDA) are as follows:

- children 7–12 months: 11 mg/day
- children 1–3 years: 7 mg/day
- children 4–8 years: 10 mg/day
- adolescent males, 9–13 years: 8 mg/day
- adolescent females, 9–13 years: 8 mg/day
- males, 14–18 years: 11 mg/day
- females, 14–18 years: 15 mg/day
- males, 19–50 years: 8 mg/day
- females, 19–50 years: 18 mg/day
- adults, over 50 years: 8 mg/day
- pregnant females: 27 mg/day
- breastfeeding females: 9–10 mg/day

A number of herbal remedies contain iron and can be useful as a natural supplement. The juice of the herb stinging **nettle** (*Urtica dioica*) is rich in both iron and vitamin C (which is thought to promote the absorption of iron). It can be taken daily as a dietary supplement. **Dandelion** (*Taraxacum officinale*), curled dock (*Rumex crispus*), and **parsley** (*Petroselinum crispum*) also have high iron content and can be prepared in tea or syrup form.

In Chinese medicine, dang gui (**dong quai**), or *Angelica sinensis*, the root of the **angelica** plant, is said to both stimulate the circulatory system and aid the digestive system. It can be administered as a decoction or tincture and should be taken in conjunction with an iron-rich diet. Other Chinese remedies include **foxglove**

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root (*Rehmannia glutinosa*), **Korean ginseng** (*Panax ginseng*), and **astragalus** (*Astragalus membranaceus*).

Ferrum phosphoricum (iron phosphate) is used in homeopathic medicine to treat anemia. The remedy is produced by mixing iron sulfate, phosphate, and **sodium** acetate, which is administered in a highly diluted form to the patient. Other homeopathic remedies for anemia include ***natrum muriaticum***, *Chinchona officinalis*, *cyclamen europaeum*, *ferrum metallicum*, and *manganum aceticum*. As with all homeopathic remedies, the type of remedy prescribed for iron deficiency depends on the individual's overall symptom picture, mood, and temperament. Patients should speak with their homeopathic professional or physician, or healthcare professional before taking any of these remedies.

Iron is also available in a number of over-the-counter supplements (i.e., ferrous fumerate, ferrous sulfate, ferrous gluconate, iron dextran). Both heme iron and non-heme iron supplements are available. Heme iron is more efficiently absorbed by the body, but non-heme iron can also be effective if used in conjunction with vitamin C and other dietary sources of heme iron. Some multivitamins also contain supplementary iron. Ingesting excessive iron can be toxic and may have long-term negative effects. For this reason, iron supplements should be taken only under the recommendation and supervision of a doctor.

Precautions

Iron deficiency can be a sign of a more serious problem, such as internal bleeding. Anyone suffering from iron-deficiency anemia should always undergo a thorough evaluation by a healthcare professional to determine the cause of the problem.

Iron overdose in children can be fatal and is a leading cause of poisoning in children. Children should never take supplements intended for adults, and they should receive iron supplementation only under the guidance of a physician.

Individuals with chronic or acute health conditions, including kidney infection, **alcoholism**, liver disease, **rheumatoid arthritis**, **asthma**, heart disease, **colitis**, and stomach ulcer, should consult a physician before taking herbal or pharmaceutical iron supplements.

If individuals taking homeopathic dilutions of *ferum phosphoricum* experience worsening of their symptoms (known as a homeopathic aggravation), they should stop taking the remedy and contact their healthcare professional. A homeopathic aggravation can be an early indication that a remedy is working properly, but it can also be a sign that a different remedy is needed.

Patients diagnosed with hemochromatosis, a genetic condition in which the body absorbs too much iron and stores the excess in organs and tissues, should never take iron supplements.

Side effects

Taking herbal or pharmaceutical iron supplements on an empty stomach may cause **nausea**. Iron supplementation may cause hard, dark stools, and individuals who take iron frequently experience **constipation**. Patients who experience dark bowel movements accompanied by stomach pains should check with their doctor, as this symptom can also indicate bleeding in the digestive tract.

Other reported side effects include stomach cramps and chest **pain**. These symptoms should be evaluated by a physician if they occur.

Some iron supplements, particularly those taken in liquid form, may stain the teeth. Taking these through a straw or with a dropper placed towards the back of the throat may be helpful in preventing staining. Toothpaste containing baking soda and/or hydrogen peroxide can be useful in removing iron stains from teeth.

Signs of iron overdose include severe **vomiting**, racing heart, bloody **diarrhea**, stomach cramps, bluish lips and fingernails, pale skin, and weakness. If overdose is suspected, the patient should contact poison control and/or seek emergency medical attention immediately.

Interactions

Iron supplements may react with certain medications, including antacids, acetohydroxamic (Lithostat), dimercaprol, etidronate, and fluoroquinolones. In addition, they can decrease the effectiveness of certain tetracyclines (antibiotics). Individuals taking these or any other medications should consult their healthcare professional before starting iron supplements.

Certain foods decrease the absorption of iron, including some soy-based foods, foods with large concentrations of **calcium**, and beverages containing **caffeine** and tannin (a substance found in black tea). These should not be taken within two hours of using an iron supplement. Some herbs also contain tannic acid and should be avoided during treatment with iron supplements. These include allspice (*Pimenta dioica*) and **bayberry** (*Myrica cerifera*, also called wax myrtle).

Individuals considering treatment with homeopathic remedies should also consult their healthcare

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KEY TERMS

Chelation—The use of a medication or herbal substances to inactivate toxic substances in the body. Chelation is used to treat iron overload in some patients.

Decoction—An herbal extract produced by mixing an herb in cold water, bringing the mixture to a boil, and letting it simmer to evaporate the excess water. The decoction is then strained and consumed hot or cold. Decoctions are usually chosen over infusion when the botanical being used is a root or berry.

Ferritin—An iron storage protein found in the blood. High levels of serum ferritin may indicate iron overload.

Hemochromatosis—Also known as iron overload; a genetic condition in which excess iron is stored in the tissues and organs by the body where it can build up to toxic amounts.

Homeopathic remedy—Used to treat illnesses that manifest symptoms similar to those that the remedy itself causes, but administered in extremely diluted doses to prevent any toxic effects.

Infusion—An herbal preparation made by mixing boiling water with an herb, letting the brew steep for 10 minutes, and then straining the herb out of the mixture. Tea is made through infusion.

Thalassemia—A group of several genetic blood diseases characterized by absent or decreased production of normal hemoglobin. Individuals who have thalassemia have to undergo frequent blood transfusions, and are at risk for iron overload.

Tincture—A liquid extract of an herb prepared by steeping the herb in an alcohol and water mixture.

professional about possible interactions with certain foods, beverages, prescription medications, aromatic compounds, and other environmental elements—factors known in **homeopathy** as *remedy antidotes*—that could counteract the efficacy of treatment for iron deficiency.

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Irritable bowel syndrome

Definition

Irritable bowel syndrome (IBS) is a common intestinal condition characterized by abdominal **pain** and cramps; changes in bowel movements (**diarrhea**, **constipation**, or both); gassiness; bloating; **nausea**; and other symptoms. There is no recognized cure for IBS. Much about the condition remains unknown or poorly understood; however, dietary changes, drugs, and psychological treatment are often able to eliminate or substantially reduce its symptoms.

Description

IBS is a condition that was once called **colitis**, spastic colon, nervous colon, spastic bowel, and functional bowel disorder. Some of these names reflected the now outdated belief that IBS is a purely psychological disorder and a product of the patient's imagination. Although modern medicine recognizes that **stress** can trigger IBS attacks, medical specialists agree that IBS is a genuine physical disorder, or group of disorders, with specific identifiable characteristics.

No one knows for sure how many Americans suffer from IBS. Surveys indicate a range of 10–20%, with perhaps as many as 30% of Americans experiencing IBS at some point in their lives. IBS normally makes its first appearance during young adulthood, and in half of all cases, symptoms begin before age 35. Women with IBS outnumber men by two to one, for

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reasons not understood as of 2008. IBS is responsible for more time lost from work and school than any medical problem other than the **common cold**. It accounts for a substantial proportion of the patients seen by gastroenterologists, who are specialists in diseases of the digestive system. Yet only half—possibly as few as 15%—of IBS sufferers ever consult a doctor.

Symptoms and Causes

The symptoms of IBS tend to rise and fall in intensity rather than grow steadily worse over time. They always include intestinal (abdominal) pain, which may be relieved by defecation; diarrhea or constipation; or diarrhea alternating with constipation. Other symptoms, which vary from person to person, include: cramps, gassiness, bloating, nausea, a powerful and uncontrollable urge to defecate (urgency), passage of a sticky fluid (mucus) during bowel movements, or the feeling after finishing a bowel movement that the bowels are still not completely empty. The accepted diagnostic criteria, known as the Rome criteria, require at least three months of continuous or recurrent symptoms before IBS is diagnosed. An estimated 70% of IBS cases can be described as "mild;" 25% as "moderate;" and 5% as "severe." In mild cases the symptoms are slight. As a general rule, they are not present all the time and do not interfere with work and other normal activities. Moderate IBS disrupts normal activities and may cause some psychological problems. People with severe IBS may constantly fear the unpredictable need for a bathroom. They often find living a normal life impossible and experience crippling psychological problems as a result. For some, the physical pain is constant and intense.

Causes

Researchers remain unsure about the cause or causes of IBS. It is called a functional disorder because it is thought to result from changes in the activity of the major part of the large intestine (the colon). After food is digested by the stomach and small intestine, the undigested material passes in liquid form into the colon, which absorbs water and salts. This process may take several days. In a healthy person the colon is quiet during most of that period except after meals, when its muscles contract in a series of wavelike movements called peristalsis. Peristalsis helps absorption by bringing the undigested material into contact with the colon wall. It also pushes undigested material that has been converted into solid or semisolid feces toward the rectum, where it remains until defecation.

In IBS, however, the normal rhythm and intensity of peristalsis is disrupted. Sometimes there is too little peristalsis, which can slow the passage of undigested material through the colon and cause constipation. Sometimes there is too much, which has the opposite effect and causes diarrhea. A Johns Hopkins University study found that healthy volunteers experienced six to eight contractions of the colon each day, compared with up to 25 contractions a day for volunteers suffering from IBS with diarrhea, and an almost complete absence of contractions among constipated IBS volunteers. In addition to differences in the number of contractions, many of the IBS volunteers experienced powerful spasmodic contractions affecting a larger-than-normal area of the colon—"like having a Charlie horse in the gut," according to one of the investigators.

DIET. Some kinds of food and drink appear to play a key role in triggering IBS attacks. Food and drink that healthy people can ingest without any trouble may disrupt peristalsis in IBS patients, which probably explains why IBS attacks often occur shortly after meals. Chocolate, milk products, **caffeine** (in coffee, tea, colas, and other drinks), and large quantities of alcohol are some of the chief culprits. Other kinds of food have also been identified as problems, however, and the pattern of what can and cannot be tolerated is different for each person. Characteristically, IBS symptoms rarely occur at night and disrupt the patient's sleep.

In 2002, a research study reported that some children had trouble absorbing certain sugars from some fruit juices, particularly apple and pear juices. When children with IBS went off these juices for one month, 46% saw improvement in their IBS symptoms. Apple and pear juice contain more fructose than glucose sugar, which may be the cause of the poor absorption in IBS sufferers' intestines. Yet white grape juice, which contains almost equal portions of fructose and glucose, is more easily absorbed.

STRESS. Stress is an important factor in IBS because of the close nervous system connections between the brain and the intestines. Although researchers do not yet understand all of the links between changes in the nervous system and IBS, they point out the similarities between mild digestive upsets and IBS. Just as healthy people can feel nauseated or have an upset stomach when under stress, people with IBS react the same way, but to a greater degree. Finally, IBS symptoms sometimes intensify during **menstruation**, which suggests that female reproductive hormones are another trigger. In fact, a study published in 2002 confirmed that IBS symptoms worsened in women and that rectal sensitivity changed with the menstrual cycle in women with IBS. It also was the first study to contrast these changes with those of healthy women.

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Diagnosis

Diagnosing IBS is a fairly complex task because the disorder does not produce changes that can be identified during a physical examination or by laboratory tests. When IBS is suspected, the doctor (a family doctor or a specialist) needs to determine whether the patient's symptoms satisfy the Rome criteria. The doctor rules out other conditions that resemble IBS, such as Crohn's disease and ulcerative colitis. These disorders are ruled out by taking a standard medical history, performing a physical examination, and ordering laboratory tests. The patient may be asked to provide a stool sample that can be tested for blood and intestinal parasites. In some cases x rays, bowel studies, or an internal examination of the colon using a flexible instrument inserted through the anus (a sigmoidoscope or colonoscope) is necessary.

Patients may also be asked to keep a diary of symptoms for two or three weeks, covering daily activities, including meals and emotional responses to events. The doctor can then review the diary with the patient to identify possible problem areas.

Treatment

Dietary adjustments are critical to controlling IBS. For some patients, a **high-fiber diet**, including whole grain breads and cereals, dried and fresh fruits, spinach, and oat bran, can reduce digestive system irritation. For others, a high-fiber diet aggravates the symptoms. Many patients with IBS also find that avoiding alcohol, caffeine, sugar, and fatty, **gas** producing, or spicy foods can prevent symptoms.

To control IBS symptoms that are triggered or made worse by stress, several stress management therapies may be helpful. These include **yoga**, **meditation**, hypnosis, **biofeedback**, **exercise**, muscle **relaxation** training, **aromatherapy**, **hydrotherapy**, and **reflexology**. Reflexology is a foot massage technique that focuses on manipulating different regions of the foot in order to bring harmony to specific organs and body systems. Hydrotherapy is the therapeutic use of water, as in a whirlpool bath.

Biofeedback, which teaches an individual to control muscle tension and any associated pain through thought and visualization techniques, is also a treatment option for IBS. In biofeedback treatments, sensors placed on the forehead of the patient are connected to a special machine that allows the patient and healthcare professional to monitor a visual and/or audible readout of the level of muscle tension and stress in the patient. Through relaxation and visualization exercises, the patient learns to relieve tension and can actually see or hear the results of his or her efforts instantly through a sensor readout on the biofeedback equipment. Once the technique is learned and the patient is able to recognize and differentiate between the feelings of muscle tension and muscle relaxation, the biofeedback equipment itself is no longer needed and the patient has a powerful, portable, and self-administered treatment tool for dealing with pain and tension.

To soothe an irritated or inflamed digestive tract, an herbalist or holistic healthcare practitioner may recommend one or more herbs, including **comfrey** root (*Symphytum officinale*), **hops** (*Humulus lupulus*), **Iceland moss** (*Cetraria islandica*), Irish moss (*Chondrus crispus*), **marsh mallow** root (*Althaea officinalis*), oats (*Avena sativa*), quince seed (*Cydonia oblonga*), and **slippery elm** (*Ulmus rubra*).

Herbs that relieve gas associated with IBS (known as carminatives) include **angelica** (*Angelica archangelica*), aniseed (*Pimpinella anisum*), caraway (*Carum carvi*), **cayenne** (*Capsicum annuum*), German **chamomile** (*Matricaria recutita*), **ginger** (*Zingiber officinale*), **thyme** (*Thymus vulgaris*), and **peppermint** (*Mentha* x *piperata*).

An infusion of meadowsweet (*Filipendula ulmaria*) may be helpful in treating diarrhea related to IBS, and herbs such as **barberry** (*Berberis vulgaris*), **Psyllium** ovata seed, **dandelion** root (*Taraxacum officinale*), **licorice** (*Glycyrrhiza glabra*), and **yellow dock** (*Rumex crispus*) have laxative properties that can help to relieve constipation. More powerful laxative herbs, such as **rhubarb root** (*Rheum palmatum*), **buckthorn** (*Rhamnus catharticus*), and cascara (*Rhamnus purshiana*) should only be taken under the direction of a healthcare professional.

Individuals with cramp-like pains, or **colic**, can benefit from antispasmodic herbs such as German chamomile (*Matricaria recutita*), **Valerian** (*Valeriana officinalis*), **lemon balm** (*Melissa officinalis*), ginger (*Zingiber officinale*), and wild yam (*Dioscorea villosa*).

Homeopathy uses highly diluted remedies that cause similar effects to the symptoms they are intended to treat in an effort to stimulate the body's natural immune response. A homeopathic physician might recommend a remedy of **belladonna**, colocynthis (bitter cucumber), phosphate of magnesia (Magnesia phosphorica), or wild hops (*Bryonia alba*) to relieve abdominal pain and cramping associated with IBS. As with all homeopathic remedies, the prescription depends on the individual's overall symptoms, mood, and temperament.

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Acupuncture and **guided imagery** may be useful tools in treating IBS symptoms. Acupuncture involves the placement of thin needles into the skin at targeted locations on the body known as acupoints in order to harmonize the energy flow within the human body. An acupuncturist may also use **moxibustion**, which involves applying a heat source such as warm herbs to the acupoint, to treat IBS symptoms. Guided imagery techniques teach the patient to visualize a peaceful, soothing scene or situation to relax the body and better cope with the discomfort caused by IBS.

Several studies have indicated **probiotics** may be beneficial in treating IBS. Researchers believe this may be due to the antiviral, antibacterial, and anti-inflammatory effects of probiotics, such as *Lactobacillus acidophilus*, commonly referred to simply as **acidophilus**, a friendly inhabitant of the gastrointestinal (GI) tract. It, as well as some related **strains** of bacteria, is known as a probiotic. Probiotic organisms secrete enzymes that support healthy digestion. They keep the flora of the intestines balanced and compete with some pathogenic organisms. One small study of the use of acidophilus to treat IBS showed more improvement in the treated group than in those who took a placebo. This is not conclusive evidence, but in view of the safety of the treatment and the scarcity of effective alternatives, many health practitioners believe acidophilus may be worth trying.

KEY TERMS

Anus—The opening at the lower end of the rectum.

Crohn's disease—A disease characterized by inflammation of the intestines. Its early symptoms may resemble those of IBS.

Defecation—Passage of feces through the anus.

Feces—Undigested food and other waste that is eliminated through the anus. Feces are also called fecal matter or stools.

Homeopathy—A system of medical practice that treats a disease by administering diluted doses of a remedy that would, in a healthy person, cause symptoms like the illness being treated. Homeopaths believe that this treatment stimulates the body's natural healing processes.

Lactose—A sugar found in milk and milk products. Some people are lactose intolerant, meaning they have trouble digesting lactose. Lactose intolerance can produce symptoms resembling those of IBS.

Peristalsis—The periodic waves of muscular contractions that move food through the intestines during the process of digestion.

Ulcerative colitis—A disease that inflames and causes breaks (ulcers) in the colon and rectum, which are parts of the large intestine.

Allopathic treatment

Dietary changes, sometimes supplemented by drugs or **psychotherapy**, are considered the key to successful treatment. A drug called alosetron was approved by the Food and Drug Administration (FDA) in 2002 for limited marketing for treating women with diarrhea-prominent IBS after some controversy in 2000 because of serious side effects from the drug. Its use should be limited to only those patients suffering from severe, chronic diarrhea-predominant IBS who have failed to respond to conventional therapy.

An individualized diet, low in saturated fats and foods that trigger the patient's reaction, can reduce symptoms for many IBS sufferers. Caffeine sources, sugar, and alcohol usually worsen symptoms. Bran or 15–25 grams a day of an over-the-counter psyllium laxative may also help both constipation and diarrhea. The patient can have milk or milk products if lactose intolerance is not a problem. Establishing set times for meals and bathroom visits may help people with irregular bowel habits, especially for constipated patients.

Although a high-fiber diet remains the standard treatment for constipated patients, such laxatives as lactulose or sorbitol may be prescribed. Loperamide and cholestyramine are suggested for diarrhea. Abdominal pain after meals can be reduced by taking antispasmodic drugs such as hyoscyamine or dicyclomine before eating.

Psychological counseling or **behavioral therapy** may be useful for some patients in reducing **anxiety** and learning to cope with the pain and other symptoms of IBS. Relaxation therapy, hypnosis, biofeedback, and cognitive-behavioral therapy are examples of behavioral therapy.

When IBS produces constant pain that interferes with everyday life, antidepressant drugs can help by blocking pain transmission from the nervous system.

Expected results

IBS is not a life-threatening condition. It does not cause intestinal bleeding or inflammation, nor does it cause other bowel diseases or **cancer**. Although IBS

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can last a lifetime, in up to 30% of cases the symptoms eventually disappear. Even if the symptoms cannot be eliminated, with appropriate treatment they can usually be decreased so that IBS becomes merely an occasional inconvenience. Treatment requires a long-term commitment, however; six months or more may be needed before the patient notices substantial improvement.

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ORGANIZATIONS

American Association of Acupuncture and Oriental Medicine, PO Box 162340, Sacramento, CA, 95816, (866) 455-7999, http://www.aaaomonline.org.

American Institute of Homeopathy, 801 N. Fairfax St., Suite 306, Alexandria, VA, 22314, (888) 445-9988, http://www.homeopathyusa.org.

Homeopathic Medical Council of Canada, 3910 Bathurst St., Suite 202, Toronto, ON, M3H 3N8, Canada, (416) 638-4622, http://www.hmcc.ca.

Irritable Bowel Syndrome Association, 1440 Whalley Ave., Suite 145, New Haven, CT, http://www.ibsassociation.org.

National Center for Alternative and Complementary Medicine, 9000 Rockville Pike, Bethesda, MD, 20892, (888) 644-6226, http://www.nccam.nih.gov.

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Ischemia

Definition

Ischemia is an insufficient supply of oxygenated blood to an organ, usually due to a blocked artery.

Description

Myocardial ischemia is an intermediate condition in coronary artery disease during which the heart tissue is slowly or suddenly starved of oxygen and other nutrients. Eventually, the affected heart tissue dies. When blood flow is completely blocked to the heart, ischemia can lead to a **heart attack**. Ischemia can be silent or symptomatic. According to the American Heart Association, up to four million Americans may have silent ischemia and be at high risk of having a heart attack with no warning.

Symptomatic ischemia is characterized by chest **pain** called **angina** pectoris. The American Heart Association estimates that nearly seven million Americans have angina pectoris, usually called angina. Angina occurs more frequently in women than in men and more often in African Americans and Hispanics than in Caucasians. It also occurs more frequently as people age—25% of women over the age of 85 and 27% of men between 80 and 84 years of age have angina.

People with angina are at risk of having a heart attack. Stable angina occurs during exertion, can be quickly relieved by resting or taking nitroglycerine, and lasts from three to 20 minutes. Unstable angina, which increases the risk of a heart attack, occurs more frequently, lasts longer, is more severe, and may cause discomfort during rest or light exertion.

Ischemia also can occur in the arteries of the brain, where blockages can lead to a **stroke**. About 80 to 85% of all strokes are ischemic. Most blockages in the cerebral arteries are due to a blood clot, often in an artery narrowed by plaque. Sometimes, a blood clot in the heart or aorta travels to a cerebral artery. A transient ischemic attack (TIA) is a mini-stroke caused by a temporary deficiency of blood supply to the brain or by a blood clot briefly blocking a cerebral artery. It occurs suddenly, lasts a few minutes to a few hours, and is a strong warning sign of an impending stroke. Ischemia can also affect intestines, legs, feet, and kidneys. Pain, malfunctions, and damage in those areas may result.

Causes and symptoms

Ischemia almost always is caused by blockage of an artery, usually due to atherosclerotic plaque.

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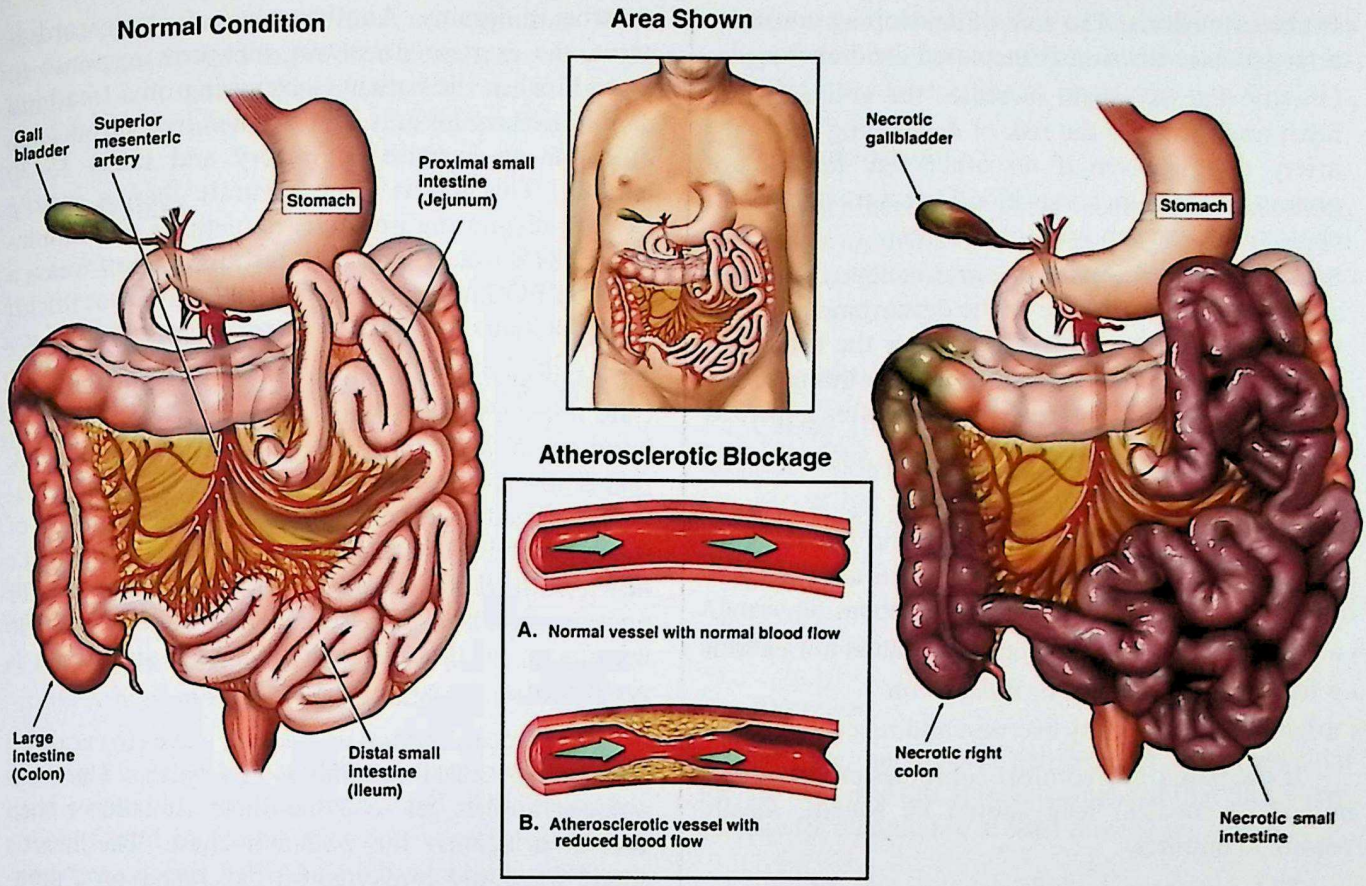

Mesenteric Ischemia. *(© Nucleus Medical Art, Inc. / Alamy)*

Myocardial ischemia also is caused by **blood clots** (which tend to form on plaque), artery spasms or contractions, or any of these factors combined. Silent ischemia usually is caused by emotional or mental **stress** or by exertion, but there are no symptoms. Angina usually is caused by increased oxygen demand when the heart is working harder than usual, for example, during **exercise** or during mental or physical stress. Researchers point out that physical stress is harder on the heart than mental stress.

Risk factors

The risk factors for myocardial ischemia are the same as those for coronary artery disease, TIA, and stroke:

- Heredity. People whose parents have coronary artery disease are more likely to develop the condition. African Americans also are at higher risk.
- Sex. Men are more likely to have heart attacks than women and to have them at a younger age. Angina is more likely to occur in women.
- Age. Men who are 45 years of age and older and women who are 55 years of age and older are considered to be at risk. Risk also increases with age.
- Smoking. Smoking increases both the chance of developing coronary artery disease and the chance of dying from it. Second-hand smoke also may increase risk.
- High cholesterol. Risk of developing coronary artery disease increases as blood cholesterol levels increase. When combined with other factors, the risk is even greater.
- High blood pressure. High blood pressure makes the heart work harder, and with time, weakens it. When combined with obesity, smoking, high cholesterol, or diabetes, the risk of heart attack or stroke increases several times.
- High fibrinogen levels. Fibrinogens are proteins involved in blood clotting and plaque formation.
- High homeocysteine levels. Homeocysteine is also involved in plaque formation.
- Oxidant damage, as indicated by high lipid peroxide levels. High lipid peroxide levels represent a high level of free radical damage and antioxidant deficiency.
- Lack of physical activity. Lack of exercise increases the risk of coronary artery disease.

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- Diabetes mellitus. The risk of developing coronary artery disease is seriously increased for diabetics.
- Obesity. Excess weight increases the strain on the heart and increases the risk of developing coronary artery disease, even if no other risk factors are present. Obesity increases blood pressure and blood cholesterol, and can lead to diabetes.
- Stress and anger. Some scientists believe that stress and anger can contribute to the development of coronary artery disease. Stress increases the heart rate and blood pressure and can injure the lining of the arteries. Angina attacks often occur after anger, as do many heart attacks and strokes.

Angina symptoms include:

- a tight, squeezing, heavy, burning, or choking pain that is usually beneath the breastbone—the pain may spread to the throat, jaw, or one arm
- a feeling of heaviness or tightness that is not painful
- a feeling similar to gas or indigestion
- attacks brought on by exertion and relieved by rest

If the pain or discomfort continues or intensifies, immediate medical help should be sought, ideally within 30 minutes.

TIA symptoms include:

- sudden weakness, tingling, or numbness, usually in one arm or leg or both the arm and leg on the same side of the body, as well as sometimes in the face
- sudden loss of coordination
- loss of vision or double vision
- difficulty speaking
- vertigo and loss of balance

Diagnosis

Diagnostic tests for myocardial ischemia include: resting, exercise, or ambulatory electrocardiograms; scintigraphic studies (radioactive heart scans); echocardiography; coronary angiography; and, rarely, positron emission tomography (PET) studies. Diagnostic tests for TIA include physician review of symptoms, computed tomography (CT) scans, carotid artery ultrasound (Doppler ultrasonography), and magnetic resonance imaging (MRI). Angiography is the best test for ischemia of any organ.

An electrocardiogram (ECG) shows the heart's activity and may reveal a lack of oxygen. Electrodes covered with conducting jelly are placed on the patient's chest, arms, and legs. Impulses of the heart's activity are recorded on paper. The test takes about 10 minutes and is performed in a physician's office. About 25% of patients with angina have normal electrocardiograms. Another type of electrocardiogram, the exercise stress test, measures response to exertion when the patient is exercising on a treadmill or a stationary bike. It is performed in a physician's office or an exercise laboratory and takes 15–30 minutes. This test is more accurate than a resting ECG in diagnosing ischemia. Sometimes an ambulatory ECG is ordered. For this test, the patient wears a portable ECG machine called a Holter monitor for 12, 24, or 48 hours.

Myocardial perfusion scintigraphy and radionuclide angiography are nuclear studies involving the injection of a radioactive material (e.g., thallium), that is absorbed by healthy tissue. A gamma scintillation camera displays and records a series of images of the radioactive material's movement through the heart. Both tests usually are performed in a hospital's nuclear medicine department and take about 30 minutes to an hour. A perfusion scan sometimes is performed at the end of a stress test.

An echocardiogram uses sound waves to create an image of the heart's chambers and valves. The technologist applies gel to a handheld transducer then presses it against the patient's chest. The heart's sound waves are converted into an image on a monitor. Performed in a cardiology outpatient diagnostic laboratory, the test takes 30 minutes to an hour. It can reveal abnormalities in the heart wall that indicate ischemia, but it does not evaluate the coronary arteries directly.

Coronary angiography is the most accurate diagnostic technique, but it also is the most invasive. It shows the heart's chambers, great vessels, and coronary arteries by using a contrast solution and x-ray technology. A moving picture is recorded of the blood flow through the coronary arteries. The patient is awake but sedated, and connected to ECG electrodes and an intravenous line. A local anesthetic is injected. The cardiologist then inserts a catheter into a blood vessel and guides it into the heart. Coronary angiography is performed in a cardiac catheterization laboratory and takes from 30 minutes to two hours.

Positron emission tomography (PET) is a noninvasive nuclear test used to evaluate the heart tissue. A PET scanner traces high-energy gamma rays released from radioactive particles to provide three-dimensional images of the heart tissue. Performed at a hospital, it usually takes from one hour to one hour and 45 minutes.

CT and MRI are computerized scanning methods. CT scanning uses a thin x-ray beam to show three-dimensional views of soft tissues. It is performed

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at a hospital or clinic and takes only minutes. MRI uses a magnetic field to produce clear, cross-sectional images of soft tissues. The patient lies on a table that slides into a tunnel-like scanner for about 30 minutes.

Treatment

Ischemia can be life-threatening. Although there are alternative treatments for angina, traditional medical care may be necessary. Prevention of the cause of ischemia, primarily **atherosclerosis**, is primary. This becomes even more important for people with a family history of **heart disease**.

Nutritional therapy

Dietary modifications are essential in the treatment and prevention of ischemic heart disease. The following dietary changes are recommended:

- Limiting intake of red meat and animal fats that contain high amounts of cholesterol and saturated fats.
- Eating a heart-wise diet with emphasis on fresh fruits and vegetables, grains, beans, and nuts. Increased fiber (found in fresh fruits and vegetables, grains, and beans) can help the body eliminate excessive cholesterol through the stools.
- Avoiding coffee (caffeinated and decaffeinated) and smoking. Not smoking will prevent damage from smoke and the harmful substances (oxidants) it contains.
- Taking high-potency multivitamin/mineral supplement (one tablet daily). Heart patients may require higher amounts of antioxidants, such as vitamins C and E. They should aim for total daily intake of 500–1000 mg of vitamin C and 400–800 IU of (natural) vitamin E. They also should take 1 tbsp of flaxseed oil or fish oil per day. Flaxseed oil is a good source of omega-3 oils. Numerous studies have demonstrated the cardio-protective effects of omega-3 fatty acids.
- Considering supplements for specific health problems. Individuals with diabetes might benefit from chromium, garlic, and pantethine supplements. Niacin, flaxseed oil, and garlic help treat elevated fibrinogen levels. For those with high homocysteine levels, vitamin B_6, B_{12}, and folic acid may be needed. Patients with high lipid peroxide levels require more antioxidants to prevent free radical damage. Antioxidants, such as vitamins C and E, selenium, *Ginkgo biloba*, bilberry (*Vaccinium myrtillus*), and hawthorn, can help prevent initial arterial injury that can lead to the formation of plaque deposits. In 2008, the U.S. Office of Complementary and Alternative Medicine reported that hawthorne was safe and effective for the treatment of mild kinds of heart failure but that there is not enough scientific evidence to support its use for other types of heart problems.

Herbal therapy

Western herbal medicine recommends **hawthorn** (*Crataegus laevigata* or *C. oxyacantha*) to help prevent long-term angina, since they strengthen heart muscles' ability to contract.

Homeopathy

Cactus (*Cactus grandiflorus*) is a homeopathic remedy used for pain relief during an attack.

Ayurvedic medicine

Abana, a mixture of herbs and minerals used in **Ayurvedic medicine**, may reduce the frequency and severity of angina attacks.

Exercises

Exercise, particularly aerobic exercise, is essential for circulation health. It is recommended that the patient exercise for 20 minutes, at least three times a week.

Mind/body medicine

Mind/body **relaxation** techniques such as **yoga**, **meditation**, stress reduction, and **biofeedback** can help ease strong emotions and stress.

Chelation therapy

The use of **chelation therapy**, a long-term injection by a physician of a mix containing synthetic amino acid, ethylenediaminetetracetic acid (EDTA), and anticoagulant drugs and nutrients, remained controversial as of 2008.

Allopathic treatment

Angina is treated with drug therapy and surgery. Drugs such as nitrates, beta-blockers, and **calcium** channel blockers relieve chest pain, but they cannot clear blocked arteries. There is some evidence that administering testosterone to men with myocardial ischemia may help reduce the risk of ischemia. Aspirin helps prevent the formation of blood clots. Many authorities recommend that people at risk for ischemia take one child's aspirin (81 mg) at night before bed. Surgical procedures include percutaneous transluminal coronary angioplasty and coronary artery bypass graft surgery.

Nitroglycerin is the classic treatment for angina. It quickly relieves pain and discomfort by opening the

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coronary arteries and allowing more blood to flow to the heart. Beta-blockers reduce the amount of oxygen required by the heart during stress. Calcium channel blockers help keep the arteries open and reduce blood pressure. Statins help reduce **cholesterol** levels, which can lessen the risk of ischemic events.

Percutaneous transluminal coronary angioplasty and coronary artery bypass graft surgery are invasive procedures that improve blood flow in the coronary arteries. Percutaneous transluminal coronary angioplasty is a procedure in which a catheter tipped with a balloon is threaded from a blood vessel in the thigh into the blocked artery. The balloon is inflated, compressing the plaque to enlarge the blood vessel and open the blocked artery. The balloon is deflated and the catheter is removed. Sometimes a metal stent is placed in the artery to prevent closing.

In coronary artery bypass graft, called bypass surgery, a detour is built around the coronary artery blockage with a healthy leg vein or chest wall artery. The healthy vein or artery then supplies oxygen-rich blood to the heart. Bypass surgery is major surgery appropriate for patients with blockages in two or three major coronary arteries or severely narrowed left main coronary arteries, as well as those who have not responded to other treatments.

As of 2008, there were several experimental surgical procedures. Two of these were atherectomy, in which a surgeon shaves off and removes strips of plaque from the blocked artery, and laser angioplasty, in which a catheter with a laser tip is inserted to burn or break down the plaque. A stenting procedure was widely used in the treatment of coronary blockages as of the late 2000s; in this procedure a metal coil, called a stent, is implanted permanently to keep a blocked artery open.

TIAs are treated by drugs that control high blood pressure and reduce the likelihood of blood clots and surgery. Aspirin is commonly used and anticoagulants are sometimes used to prevent blood clots. In some cases, carotid endarterectomy surgery is performed to help prevent further TIAs. The procedure involves removing arterial plaque from inside blood vessels.

Expected results

In many cases, ischemia can be successfully treated, but the underlying disease process of atherosclerosis is usually not cured. Certain diagnostic techniques have been developed to enable doctors to identify ischemia earlier. These technologies and surgical procedures can prevent angina from leading to a heart attack or TIA from resulting in a stroke. The outcome for patients with silent ischemia had not been well established as of 2008.

Prevention

A healthy lifestyle, including eating right, getting regular exercise, maintaining a healthy weight, not **smoking**, drinking in moderation, not using illegal drugs, controlling **hypertension**, and managing stress, can reduce the risk of ischemia progressing to a heart attack or stroke.

A healthy diet includes a variety of foods that are low in fat (especially saturated fat), low in cholesterol, and high in fiber. Plenty of fruits and vegetables should be eaten and **sodium** should be limited. Fat should comprise no more than 30% of total daily calories. Cholesterol should be limited to about 300 mg and sodium to about 2,400 mg per day.

The Centers for Disease Control and Prevention and the American College of Sports Medicine recommend moderate aerobic exercise lasting about 30 minutes four or more times per week for maximum heart health. Three 10-minute exercise periods also are beneficial. If any risk factors are present, a physician's clearance should be obtained before starting exercise.

Maintaining a desirable body weight also is important. People who are 20% or more over their ideal body weight have an increased risk of developing coronary artery disease or stroke.

Smoking has many adverse effects on the heart and arteries and should be avoided. Heart damage caused by smoking can be improved by quitting. Several studies have shown that ex-smokers face the same risk of heart disease as nonsmokers within five to ten years after quitting.

Excessive drinking can increase risk factors for heart disease. Modest consumption of alcohol, however, can actually protect against coronary artery disease. The American Heart Association defines moderate consumption as one ounce of alcohol per day—roughly one cocktail, one 8 oz glass of wine, or two 12 oz glasses of beer.

Commonly used illegal drugs can seriously harm the heart and should never be used. Even stimulants such as **ephedra** and decongestants like pseudoephedrine can be harmful to patients with hypertension or heart disease.

Treatment should be sought for hypertension. High blood pressure can be completely controlled through lifestyle changes and medication. Stress, which can increase the risk of a heart attack or stroke, should also be managed. While it cannot always be avoided, it can be controlled.

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KEY TERMS

Atherosclerosis—A process in which the walls of the arteries thicken due to the accumulation of plaque in the blood vessels. Atherosclerosis is the cause of most coronary artery disease.

Coronary artery disease—A narrowing or blockage, due to atherosclerosis, of the arteries that provide oxygen and nutrients to the heart. When blood flow is cut off, the result is a heart attack.

Plaque—A deposit of fatty and other substances that accumulate in the lining of the artery wall.

Stroke—A sudden decrease or loss of consciousness caused by rupture or blockage of a blood vessel by a blood clot or hemorrhage in the brain. Ischemic strokes are caused by blood clots in a cerebral artery.

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National Heart, Lung, and Blood Institute Information Center, PO Box 30105, Bethesda, MD, 20824-0105, (301) 592 8573, http://www.nhlbi.nih.gov/.

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Italian diet *see* **Mediterranean diet**

Itching

Definition

Itching is an intense, distracting irritation or tickling sensation that may be felt all over the skin's surface or confined to just one area. The medical term for itching is pruritus.

Description

Itching leads most people instinctively to scratch the affected area. Different people can tolerate different amounts of itching, and anyone's threshold of tolerance can be changed due to **stress**, emotions, and other factors. In general, itching is more severe if the skin is warm, and if there are few distractions. This is why people tend to notice itching more at night.

Causes and symptoms

As of 2002, the recent discovery of itch-specific neurons (nerve cells) has given doctors a better understanding of the causes of the sensation of itching. Another factor that contributes to itching is the release of endogenous opioids in the body. While these chemicals function primarily to relieve **pain**, they also appear to enhance the sensation of itching. Although itching is the most noticeable symptom of many skin diseases, however, it doesn't necessarily mean that a person who feels itchy has a disease.

Stress and emotional upset can make itching worse, no matter what the underlying cause. If emotional problems are the primary reason for feeling itchy, the condition is known as psychogenic itching. Some people become convinced that their itch is caused by a parasite or some medical disorder. This conviction is often linked to burning sensations in the tongue, and may be caused by a major psychiatric disorder.

Generalized itching

Itching that occurs all over the body may indicate a medical condition such as **diabetes mellitus**, liver disease, kidney failure, **jaundice**, thyroid disorders, and rarely, **cancer**. Blood disorders such as **leukemia**, and lymphatic conditions such as **Hodgkin's disease** may sometimes cause itching as well.

Some people may develop an itch without a rash when they take certain drugs (such as aspirin, codeine, cocaine). Others may develop an itchy, red "drug rash" or **hives** because of an allergy to a specific drug.

A team of researchers in Texas has discovered that some people infected by *Helicobacter pylori*, a bacterium that causes **gastritis**, also develop itching that

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KEY TERMS

Atopic dermatitis—An intensely itchy inflammation often found on the face of people prone to allergies. In infants and early childhood, it's called infantile eczema.

Creeping eruption—Itchy irregular, wandering red lines on the skin made by burrowing larvae of the hookworm family and some roundworms. Also called cutaneous larva migrans.

Dermatitis herpetiformis—A chronic, very itchy skin disease with groups of red lesions that leave spots behind when they heal. It is sometimes associated with cancer of an internal organ.

Eczema—A superficial type of inflammation of the skin that may be very itchy and weeping in the early stages; later, the affected skin becomes crusted, scaly, and thick. There is no known cause.

Endogenous opioids—Natural pain relievers produced by the body that are also associated with the sensation of itching.

Hodgkin's disease—A type of cancer characterized by slowly enlarging lymph tissue; symptoms include generalized itching.

Lichen planus—A noncancerous, chronic, itchy skin disease that causes small, flat purple plaques on wrists, forearm, and ankles.

Neurodermatitis —An itchy skin disease (also called lichen simplex chronicus) found in nervous, anxious people.

Psoriasis—A common, chronic skin disorder that causes red patches anywhere on the body.

Scabies—A contagious parasitic skin disease characterized by intense itching.

Swimmer's itch—An allergic skin inflammation caused by a sensitivity to flatworms that die under the skin, causing an itchy rash.

does not respond to usual treatments. When the bacterium is eradicated from the patient's digestive tract, the itching is relieved.

Itching also may be caused when hookworm larvae penetrate the skin. This includes swimmer's itch, creeping eruption caused by cat or dog hookworm, and ground itch caused by the "true" hookworm.

Skin conditions that cause an itchy rash include:

- atopic dermatitis
- chickenpox
- contact dermatitis
- dermatitis herpetiformis (occasionally)
- eczema
- fungal infections (such as athlete's foot)
- hives (urticaria)
- insect bites
- lice
- lichen planus
- neurodermatitis (lichen simplex chronicus)
- psoriasis (occasionally)
- Scabies

Itching all over the body can be caused by something as simple as bathing too often, which removes the skin's natural oils and may make the skin too dry and scaly.

Localized itching

Specific itchy areas may occur if a person comes in contact with soaps, detergents, and wool or other rough-textured, scratchy material. Adults who have **hemorrhoids**, anal fissure, or persistent **diarrhea** may notice pruritus ani (itching around the anus). In children, itching in this area is most likely due to **worms**.

Intense itching called pruritus vulvae (itching of the external genitalia in women) may be due to a **yeast infection**, hormonal changes, **contact dermatitis**, or the use of certain spermicides, vaginal suppositories, ointments, or deodorants.

It's also common for older people to suffer from dry, itchy skin (especially on the back) for no obvious reason. Moreover, older people are more likely to develop itching as a side effect of prescription medications. Younger people may notice dry, itchy skin in cold weather. Itching is also a common complaint during **pregnancy**.

Diagnosis

Itching is a symptom that is quite obvious to its victim. Someone who itches all over should seek medical care. Because itching can be caused by such a wide variety of triggers, a complete physical exam and medical history will help diagnose the underlying problem. A variety of blood and stool tests may help determine the underlying cause.

Treatment

In general, itchy skin should be treated very gently. While scratching may temporarily ease the itch, in the long run scratching just makes it worse. In

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addition, scratching can lead to an endless cycle of more itching and scratching.

To avoid the urge to scratch, a person can apply a cooling or soothing lotion or cold compress to the area. Itching may be relieved by applying a warm compress of diluted vinegar, preferably herbal vinegars such as **plantain**, violet, lavender, or rose.

The itching associated with mosquito **bites** can be reduced by applying meat tenderizer paste, table salt (to wet skin), or toothpaste. Any alkaline preparation (like a paste of baking soda and water) will help ease the itch.

Probably the most common cause of itching is dry skin. **Flaxseed** oil and **vitamin E** taken orally can help to rehydrate dry skin and can reduce itching. There are a number of simple things a person can do to relieve itching.

- Don't wear tight clothes.
- Avoid synthetic fabrics.
- Don't take long baths.
- Wash the area in lukewarm water with a little baking soda.
- Take a lukewarm shower for generalized itching.
- Try a lukewarm oatmeal (or Aveeno) bath for generalized itching.
- Apply bath oil or lotion (without added colors or scents) right after bathing.

Practitioners of Chinese medicine utilize a wide variety of herbs as well as **acupuncture** and ear acupuncture to treat itching based upon the cause. The medicine Xiao Feng Zhi Yang Chong Ji (Eliminate Wind and Relieve Itching Infusion) can be taken three times daily to relieve itching. For external treatment of itching, the patient may bathe in Zhi Yang Xi Ji (Relieve Itching Washing Preparation) and apply She Chuang Zi Ding (Cnidium Tincture) and Zhi Yang Po Fen (Relieve Itching Powder).

Emotional stress can trigger many different dermatoses including certain itching **rashes**. Hypnosis has been helpful in treating atopic **dermatitis**, itching, **psoriasis**, hives, and other dermatoses.

In several small studies, transcutaneous electrical nerve stimulation (TENS) has been effective in temporarily relieving chronic itch associated with varying dermatoses. TENS is a treatment where mild electrical current is passed through electrodes on the skin to stimulate nerves and block pain signals. Portable TENS units are available for home use.

Cutaneous field stimulation (CFS) was found to safely relieve experimentally induced itching for a longer time period than TENS. CFS electrically stimulates nerves in the skin to harmlessly mimic scratching and inhibit the itch sensation.

Herbal itch remedies

The following herbal remedies for itching are used externally:

- aloe vera
- bracken juice
- bird-of-paradise (*Strelitzia reginae*) flowers
- cabbage leaf poultice
- cattail (*Typha latifolia*) juice
- chickweed (*Stellaria media*) salve
- comfrey (*Symphytum officinale*) juice
- evening primrose (*Oenothera biennis*) oil
- heal-all (*Prunella vulgaris*) juice
- honeysuckle vine flowers and leaves
- marigold (*Caledula officinalis*)
- marsh mallow (*Althaea officinalis*) leaf poultice
- myrrh (*Commiphora* species) oil
- oats (*Avena sativa*) bath or poultice
- onion juice
- papaya fruit
- plantain (*Plantago major*) juice or poultice
- red pepper juice
- Sage (*salvia officinalis*) leaves
- St. John's wort (*Hypericum perforatum*)
- tea tree (*Melaleuca alternifolia*) oil
- yellow dock (*Rumex crispus*) tea bath

Allopathic treatment

Specific treatment of itching depends on the underlying cause. Such antihistamines as diphenhydramine (Benadryl) can help relieve itching caused by hives, but won't affect itching from other causes. Most antihistamines also make people sleepy, which can help patients sleep who would otherwise be awake from the itch. Newer antihistamines that do not make people drowsy as a side effect are also available to treat itching.

Creams or ointments containing cortisone may help control the itch from insect bites, contact dermatitis, or **eczema**. Cortisone cream should not be applied to the face unless a doctor prescribes it, and should not be used over the body for prolonged periods without a doctor's approval.

A newer medication that relieves the itching associated with **burns** as well as speeding the healing

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process is called dexpanthenol. Dexpanthenol helps to relieve the itching by preventing the affected skin from drying out.

Expected results

Most cases of itching go away when the underlying cause is treated successfully.

Prevention

Soaps are often irritating and drying to the skin and can make an itch worse. They should be avoided or used only when necessary. People who tend to have itchy skin should:

- Avoid bathing daily.
- Use lukewarm water when bathing.
- Use mild soap.
- Pat (not rub) the skin dry after bathing, leaving some water on the skin.
- Apply a moisturizer immediately after the bath, but avoid lanolin products.
- Use a humidifier, particularly during heating season in colder climates.

Eating **garlic** and onion and taking vitamin B supplements may help to repel mosquitoes. Application of cedar, **sage**, **pennyroyal**, **rosemary**, artemisia, or marigold to the skin may also repel mosquitoes

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American Academy of Dermatology. 930 N. Meacham Rd., PO Box 4014, Schaumburg, IL 60168. (708) 330-0230.

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J

Jamaica dogwood

Description

Jamaica dogwood, *Piscidia erythrina* or *Piscidia piscipula,* is an herb that is used to treat **insomnia**, **muscle spasms**, and severe nerve **pain** called **neuralgia**. The plant is native to Central America, the West Indies, and Florida. It is also called *Fish Poison Tree.* As of 2008, it could also be found growing in parts of Texas, Mexico, and the northern region of South America. The plant is covered with a yellowish or grayish brown bark, which emits an offensive odor. Inside, the surface is light colored or white. The herb tastes acrid and bitter and causes a burning sensation in the mouth. The bark is the portion of the plant containing its medicinal properties. Jamaica dogwood is a potent herb, with the potential for toxicity. As of 2008 it had not undergone safety testing or much research.

Jamaica dogwood was discovered by scientists in the mid-1800s, when its pain-relieving properties and ability to promote sweat gained acclaim. In Central America and South America, it has been a widely used fish poison. In the early part of the twentieth century, Jamaica dogwood made its way into the medical literature when a Harvard researcher named Vedux-Tyrode wrote about it. His 1902 article, published in the *Journal of Medical Research,* explained that a solution containing Jamaica dogwood was toxic to frogs, eventually causing death, yet death did not occur in warm-blooded creatures such as rabbits. The researcher concluded that more investigation was needed to determine the pharmacological properties inherent in Jamaica dogwood.

Jamaica dogwood contains a substance known as rotenone, an insect-killing agent used to destroy fleas, lice, and larvae. At recommended doses, rotenone is not known to be harmful to humans or other warm-blooded animals.

General uses

In general, Jamaica dogwood is used to control nerve pain, promote sleep, and reduce spasms. In studies, Jamaica dogwood has been shown to possess a variety of other potential benefits, although further research in these areas is needed:

- Cough reliever
- Fever reducer
- Anti-inflammatory agent

In alternative health treatments, it may be used to treat the following:

- Anxiety
- Coughing
- Menstrual pain
- Headache, particularly migraine
- Nerve Pain
- Toothache
- Insomnia

Preparations

Jamaica dogwood has been available as dried root bark, powder, tincture, or liquid extract. But as of 2008 the liquid extract was no longer available in the marketplace. However, Jamaica dogwood can be found in some medicinal preparations.

Precautions

Jamaica dogwood is a powerful herb that can be toxic at higher dosages. Its safety had not been tested as of 2008. It should be used only under the advice of a healthcare professional. Jamaica dogwood should not be taken by women who are pregnant or breastfeeding, nor should older individuals or children take it.

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KEY TERMS

Anti-inflammatory agent—A medication or treatment that reduces inflammation, redness, and swelling.

Trembling—A shaking of a body part.

Side effects

Jamaica dogwood should be stopped immediately and the physician should be promptly notified if signs of an allergy occur, such as **itching**, rash, swelling, tightness in the chest or throat, or difficulty breathing. Side effects include increased drooling and sweating, **fatigue**, **nausea**, gastric disorders, and nerve symptoms such as numbness, twitching, or trembling.

Interactions

Jamaica dogwood may increase the effects of drugs used for **anxiety** or sleeplessness, such as Ambien, Seconal, and Valium. Consumers should check with their physician before taking Jamaica dogwood.

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University of Maryland Health Center, Health Library, College Park, MD, 20742, (301) 314-8180, http://www.umm.edu.

Rhonda Cloos, RN

Japanese traditional medicine *see* **Kampo medicine**

Jaundice

Definition

Jaundice is a condition in which a person's skin and the whites of the eyes are discolored yellow due to an increased level of bile pigments in the blood resulting from liver disease. Jaundice is sometimes called *icterus*, from a Greek word for "the condition."

Jaundice due to primary billary cirrhosis. *(© Medical-on-Line / Alamy)*

Description

In order to understand jaundice, it is useful to know about the role of the liver in producing bile. The most important function of the liver is the metabolic processing of "chemical" waste products like **cholesterol**, and excreting them into the intestines as bile. The liver is the premier "chemical" factory in the body—most incoming and outgoing chemicals pass through it. It is the first stop for all nutrients, toxins, and drugs absorbed by the digestive tract. The liver also collects chemicals from the blood for processing. Many of these outward bound chemicals are excreted into the bile. One particular substance, bilirubin, is yellow. Bilirubin is a product of the breakdown of hemoglobin, which is the protein inside red blood cells. If bilirubin cannot leave the body, it accumulates and discolors other tissues. The normal total level of bilirubin in blood serum is between 0.2 mg/dL and 1.2 mg/dL. When it rises to 3 mg/dL or higher, the person's skin and the whites of the eyes become noticeably yellow.

Bile is formed in the liver. It then passes into the network of hepatic bile ducts, which join to form a single tube. A branch of this tube carries bile to the gallbladder, where it is stored, concentrated, and released on a signal from the stomach. Food entering the stomach is the signal that stimulates the gallbladder to release the bile. The tube, which is called the common bile duct, continues to the intestines. Before the common bile duct reaches the intestines, it is joined by another duct from the pancreas. The bile and the pancreatic juice enter the intestine through a valve

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called the Ampulla of Vater. After entering the intestine, the bile and pancreatic secretions together help in the process of digestion.

Causes and symptoms

There are many different causes for jaundice, but they can be divided into three categories based on where they start—before (pre-hepatic), in (hepatic), or after (post-hepatic) the liver. When bilirubin begins its life cycle, it cannot be dissolved in water. Thus, the liver changes it so that it is soluble in water. These two types of bilirubin are called unconjugated (insoluble) and conjugated (soluble). Blood tests can easily distinguish between these two types of bilirubin.

Hemoglobin and bilirubin formation

Bilirubin begins as hemoglobin in the blood-forming organs, primarily the bone marrow. If the production of red blood cells (RBCs) falls below normal, the extra hemoglobin finds its way into the bilirubin cycle and adds to the pool.

Once hemoglobin is in the red cells of the blood, it circulates for the life span of those cells. The hemoglobin that is released when the cells die is turned into bilirubin. If for any reason the RBCs die at a faster rate than usual, then bilirubin can accumulate in the blood and cause jaundice.

Hemolytic disorders

Many disorders speed up the death of red blood cells. The process of red blood cell destruction is called hemolysis, and the diseases that cause it are called hemolytic disorders. If red blood cells are destroyed faster than they can be produced, the patient develops **anemia**. Hemolysis can occur in a number of diseases, disorders, conditions, and medical procedures:

- Malaria. The malaria parasite develops inside red blood cells. When it is mature it breaks the cell apart and swims off in the blood. This process happens to most of the parasites simultaneously, causing the intermittent symptoms of the disease. When enough cells burst at once, jaundice may result from the large amount of bilirubin formed from the hemoglobin in the dead cells. The pigment may reach the urine in sufficient quantities to cause "blackwater fever," an often lethal form of malaria.
- Side effects of certain drugs. Some common drugs can cause hemolysis as a rare, but sudden, side effect. These medications include some antibiotic and antituberculosis medicines; drugs that regulate the heartbeat; and levodopa, a drug used to treat Parkinson's disease.
- Certain drugs in combination with a hereditary enzyme deficiency known as glucose–6–phosphate dehydrogenase (G6PD). G6PD is a deficiency that affects more than 200 million people in the world. Some of the drugs listed above are more likely to cause hemolysis in people with G6PD. Other drugs cause hemolysis only in people with this disorder.

KEY TERMS

Ampulla of Vater—The widened portion of the duct through which the bile and pancreatic juices enter the intestine. *Ampulla* is a Latin word describing a bottle with a narrow neck that opens into a wide body.

Anemia—A condition in which the blood does not contain enough hemoglobin.

Biliary system/bile ducts—The gall bladder and the system of tubes that carry bile from the liver into the intestines.

Bilirubin—A reddish pigment excreted by the liver into the bile as a breakdown product of hemoglobin.

Crigler-Najjar syndrome—A moderate to severe form of hereditary jaundice.

Erythroblastosis fetalis—A disorder of newborn infants marked by a high level of immature red blood cells (erythroblasts) in the infant's blood.

Gilbert's syndrome—A mild hereditary form of jaundice.

Glucose–6–phosphate dehydrogenase (G6PD) deficiency—A hereditary disorder that can lead to episodes of hemolytic anemia in combination with certain medications.

Hemoglobin—The red chemical in blood cells that carries oxygen.

Hemolysis—The destruction or breakdown of red blood cells.

Hepatic—Refers to the liver.

Icterus—Another name for jaundice.

Microangiopathic—Pertaining to disorders of the small blood vessels.

Pancreas—The organ beneath the stomach that produces digestive juices, insulin, and other hormones.

Sickle cell disease—A hereditary defect in hemoglobin synthesis that changes the shape of red cells and makes them more fragile.

Splenectomy—Surgical removal of the spleen.

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Most important among these drugs are antimalarial medications, such as quinine, and vitamins C and K.

- Poisons. Snake and spider venom, certain bacterial toxins, copper, and some organic industrial chemicals directly attack the membranes of red blood cells.
- Artificial heart valves. The inflexible moving parts of heart valves damage RBCs as they flutter back and forth. This damage is one reason to recommend pig valves and valves made of other organic materials.
- Hereditary RBC disorders. There are a number of hereditary defects that affect the blood cells. There are many genetic mutations that affect the hemoglobin itself, the best known of which is sickle cell disease. Such hereditary disorders as spherocytosis weaken the outer membrane of the red cell. There are also inherited defects that involve the internal chemistry of RBCs.
- Enlargement of the spleen. The spleen is an organ that is located near the upper end of the stomach and filters the blood. It is supposed to filter out and destroy only worn out RBCs. If it has become enlarged, it filters out normal cells, as well. Malaria, other infections, cancers and leukemias, some of the hereditary anemias mentioned above, obstruction of blood flow from the spleen—all these and many more diseases can enlarge the spleen to the point where it removes too many red blood cells.
- Diseases of the small blood vessels. Hemolysis that occurs in diseased small blood vessels is called microangiopathic hemolysis. It results from damage caused by rough surfaces on the inside of the capillaries. The RBCs squeeze through capillaries one at a time and can easily be damaged by scraping against the vessel walls.
- Immune reactions to RBCs. Several types of cancer and immune system diseases produce antibodies that react with RBCs and destroy them. In 75% of cases, this reaction occurs all by itself, with no underlying disease to account for it.
- Transfusions. If a patient is given an incompatible blood type, hemolysis results.
- Kidney failure and other serious diseases. Several diseases are characterized by defective blood coagulation that can destroy red blood cells.
- Erythroblastosis fetalis. Erythroblastosis fetalis is a disease of newborns marked by the presence of too many immature red blood cells (erythroblasts) in the baby's blood. When a baby's mother has a different blood type, antibodies from the mother may leak into the baby's circulation and destroy blood cells. This reaction can produce severe hemolysis and jaundice in the newborn. Rh factor incompatibility is the most common cause.
- High bilirubin levels in newborns. Even in the absence of blood type incompatibility, the newborn's bilirubin level may reach threatening levels.

Normal jaundice in newborns

Normal newborn jaundice is the result of two conditions occurring at the same time—a pre-hepatic and a hepatic source of excess bilirubin. First of all, the baby at birth immediately begins converting hemoglobin from a fetal type to an adult type. The fetal type of hemoglobin was able to extract oxygen from the lower levels of oxygen in the mother's blood. At birth the infant can extract oxygen directly from his or her own lungs and does not need the fetal hemoglobin any more. So fetal hemoglobin is removed from the system and replaced with adult hemoglobin. The resulting bilirubin loads the system and places demands on the liver to clear it. But the liver is not quite ready for the task, so there is a period of a week or so when the liver has to catch up. During that time the baby is jaundiced.

In 2002, studies found that infants younger than eight weeks old with jaundice often had hidden (asymptomatic) urinary tract **infections**. Previous studies have shown that newborn jaundice may be an early sign of bacterial infections in infants. The study recommended that pediatricians routinely test young infants with jaundice for urinary tract infections.

Hepatic jaundice

Liver diseases of all kinds threaten the organ's ability to keep up with bilirubin processing. Starvation, circulating infections, certain medications, **hepatitis**, and **cirrhosis** can all cause hepatic jaundice, as can certain hereditary defects of liver chemistry, including Gilbert's syndrome and Crigler-Najjar syndrome.

Post-hepatic jaundice

Post-hepatic forms of jaundice include the jaundices caused by failure of soluble bilirubin to reach the intestines after it has left the liver. These disorders are called obstructive jaundices. The most common cause of obstructive jaundice is the presence of **gallstones** in the ducts of the biliary system. Other causes have to do with birth defects and infections that damage the bile ducts; drugs; infections; cancers; and physical injury. Some drugs—and **pregnancy** on rare occasions—simply cause the bile in the ducts to stop flowing.

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Symptoms and complications associated with jaundice

Certain chemicals in bile may cause **itching** when too much of them end up in the skin. In newborns, insoluble bilirubin may get into the brain and do permanent damage. Long standing jaundice may upset the balance of chemicals in the bile and cause stones to form. Apart from these potential complications and the discoloration of skin and eyes, jaundice by itself is inoffensive. Other symptoms are determined by the disease producing the jaundice.

Diagnosis

Physical examination

In many cases, the diagnosis of jaundice is suggested by the appearance of the patient's eyes and complexion. The doctor will ask the patient to lie flat on the examining table in order to feel (palpate) the liver and spleen for enlargement and to evaluate any abdominal **pain**. The location and severity of abdominal pain and the presence or absence of **fever** help the doctor to distinguish between hepatic and obstructive jaundice.

Laboratory tests

Disorders of blood formation can be diagnosed by more thorough examination of the blood or the bone marrow, where blood is made. Occasionally a bone marrow biopsy is required, but usually the blood itself will reveal the diagnosis. The spleen can be evaluated by an ultrasound examination or a nuclear scan if the physical examination has not yielded enough information.

Imaging studies

Disease in the biliary system can be identified by imaging techniques, of which there are many. X rays are taken a day after swallowing a contrast agent that is secreted into the bile. This study gives functional, as well as anatomical, information. There are several ways of injecting x-ray dye directly into the bile ducts. It can be done through a thin needle pushed straight into the liver, or through a scope passed through the stomach that can inject dye into the Ampulla of Vater. CT and MRI scans are very useful for imaging certain conditions, such as cancers in and around the liver, or gallstones in the common bile duct.

Liver disease is usually assessed from blood studies alone, but again a biopsy may be necessary to clarify less obvious conditions. A liver biopsy is performed at the bedside. The doctor uses a thin needle to take a tiny core of tissue from the liver. The tissue sample is sent to the laboratory for examination under a microscope.

Assessment of jaundice in newborns

Newborns are more likely to have problems with jaundice if:

- They are premature.
- They are of Asian or Native American descent.
- They have been bruised during the birth process.
- They have lost too much weight during the first few days.
- They are born at a high altitude.
- The mother has diabetes.
- Labor had to be induceds.

Research is continuing to find noninvasive methods to determine bilirubin levels in newborns so that physicians did not have to rely on visual examination alone to determine which infants should receive blood tests. Once these measurements of skin pigment can be shown effective and cost-effective in clinical practice, they may become more available. Another study used this measurement method incorporated into home health visits to monitor babies within 24 hours of discharge from the hospital following birth.

Treatment

Jaundice is often early warning sign of serious liver damage. Alternative medicine treatments should not be used as a substitute for conventional medical treatment. Patients should contact their doctors for diagnosis and treatment immediately if experiencing signs and symptoms of jaundice. Alternative therapies may be helpful as complementary measures for patients who have an underlying disease that already has been diagnosed.

Nutritional therapy

Naturopaths or nutritionists may recommend the following dietary changes:

- Drinking fresh vegetable or fruit juices during the first several weeks after diagnosis and eating a diet consisting mostly of raw fruits and vegetables, seeds, and nuts during the next month. These fruits and vegetables are easy to digest and contain lots of antioxidants, vitamins and minerals. They help the body remove toxins from the blood, and decrease stress/strain on the liver for digestion/metabolism.
- Fasting intermittently.

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- Eliminate alcohol from the diet for good, and avoiding foods that are processed and high in fat. These foods are bad for the liver.
- Drinking a cup of lemonade (without sugar) early in the morning to improve liver and bile function.
- Incorporating olive oil or lemon oil into the diet as a liver flush regimen.
- Taking nutritional supplements, such as multivitamins or minerals, vitamin C, vitamin B complex, other antioxidant-containing supplements, supplements containing alpha lipoic acid, protein supplements, essential fatty acids (EFAs), and digestive enzymes with bile (for patients having pale stools).

Traditional Chinese medicine

Depending on a patient's specific condition, an expert Chinese herbalist may prescribe herbal remedies that can help improve liver function. Animal studies have shown the following Chinese herbs may have liver protective effects:

- *Bupleurum chinense*
- *Phellodendron wilsonii*
- *Clementis chinensis*

Herbal therapy

Patients should consult an experienced herbalist for specific herbal treatments that may include **milk thistle** or **artichoke**.

Homeopathy

For homeopathic therapy, patients should consult a homeopathic physician who will prescribe specific remedies based on knowledge of the underlying cause.

Juice therapy

Juice therapy helps the liver detoxify toxins to be eliminated from the body. Patients should mix one part of pure juice with one part of water before drinking. Daily consumption of the following juices may be helpful:

- carrot and beet juice with a touch of radish or dandelion root juice
- grapes, pear, and lemon
- carrot, celery, and parsley
- carrot, beet, and cucumber

Aromatherapy

Essential oils of **rosemary**, lemon, and geranium may help improve liver function and relax the body. They can be given as inhalants, a soothing bath, or soak.

Other therapies

Other alternative treatments that may be help improve liver function include **fasting**, Ayurveda, **hydrotherapy**, and **acupuncture**.

Allopathic treatment

Jaundice in newborns

Newborns are the only major category of patients in whom the jaundice itself requires attention. If there is reason to suspect increased hemolysis in the newborn, the bilirubin level must be measured repeatedly during the first few days of life. If the level of bilirubin shortly after birth threatens to go too high, treatment must begin immediately. Exchanging most of the baby's blood was the only way to reduce the amount of bilirubin until a few decades ago. Jaundiced babies are now fitted with eye protection and placed under bright fluorescent blue lights. The light chemically alters the bilirubin in the blood as it passes through the baby's skin so that it may be more easily eliminated in the urine. In 2003, researchers tested a new drug called Stanate that showed promise in blocking bilirubin production. However, debate concerning the use of the drug for treatment of only those infants with jaundice or as a preventive measure was delaying its FDA approval and widespread use.

Hemolytic disorders

Hemolytic diseases are treated, if at all, with medications and blood transfusions, except in the case of an enlarged spleen. Surgical removal of the spleen (splenectomy) can sometimes cure hemolytic anemia. Drugs that cause hemolysis or arrest the flow of bile must be stopped immediately.

Hepatic jaundice

Most liver diseases have no specific cure, but the liver is so robust that it can heal from severe damage and regenerate itself from a small remnant of its original tissue.

Post-hepatic jaundice

Obstructive jaundice frequently requires a surgical cure. If the original passageways cannot be restored, surgeons have several ways to create alternate routes. To create alternate passageways, a surgeon will sew an open piece of intestine over a bare patch of liver. Tiny bile ducts in that part of the liver will begin to discharge their bile into the intestine, and pressure from the obstructed ducts elsewhere will find release in that direction. As the flow increases, the

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ducts grow to accommodate it. Soon, all the bile is redirected through the open pathways.

Prevention

Erythroblastosis fetalis can be prevented by giving an Rh negative mother a gamma globulin solution called RhoGAM whenever there is a possibility that she is developing antibodies to her baby's blood. G6PD hemolysis can be prevented by testing patients before giving them drugs that can cause it. Medication side effects can be minimized by early detection and immediate cessation of the drug. **Malaria** can often be prevented by taking certain precautions when traveling in tropical or subtropical countries. These precautions include staying in after dark; using prophylactic drugs such as mefloquine; and protecting sleeping quarters with mosquito nets treated with insecticides and mosquito repellents. In 2003, new studies showed promise for a possible vaccine against malaria. Early trials showed that vaccination combination might stimulate T-cell activity against malaria, the best type of protection that researchers can hope to find. However, further studies will have to be done.

New research in 2002 linked a popular antidepressant drug paroxetine (Paxil) to several newborn complications, including jaundice. Although research is preliminary, pregnant women might want to discuss use of the drug with their physicians to prevent complications like jaundice in their newborn babies.

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American Liver Foundation. 1425 Pompton Avenue, Cedar Grove, New Jersey 07009. 800 223–0179. http://www.liverfoundation.org.

Teresa G. Odle

Jet lag

Definition

Jet lag is a commonplace condition marked by **fatigue**, **insomnia**, and irritability that is caused by air travel through a number of time zones. Some studies have shown that up to 90% of all international business travelers experienced at least a mild form of jet lag.

Description

Living organisms are accustomed to periods of night and day alternating at set intervals. Most of the human body's regulating hormones follow this cycle, known as circadian rhythm. The word circadian comes from the Latin, *circa*, meaning "about," and *dies*, meaning "day." These cycles are not exactly 24 hours long, hence the approximation indicated in "circa." Each chemical has its own cycle of highs and lows, interacting with and influencing the other cycles. Body temperature, sleepiness, thyroid function, growth hormone, metabolic processes, adrenal hormones, and

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the sleep hormone **melatonin** all cycle with daylight. There is a direct connection between the retina (where light hits the back of the eye) and the part of the brain that controls all these hormones. Artificial light has some effect, but sunlight has much more. Disruption of circadian rhythms affects the sleep-wake cycles of night shift workers as well as travelers.

When people are without clocks in a compartment that is completely closed to sunlight, most of them fall into a circadian cycle of about 25 hours. Typically, all the regulating chemicals follow one another in order like threads in a weaving pattern. Every morning the sunlight resets the cycle, stimulating the leading chemicals and thus compensating for the difference between the 24-hour day and the 25-hour innate rhythm.

When traveling through a number of time zones, most people reset their rhythms within a few days, demonstrating the adaptability of the human body. Some people, however, have upset rhythms that last indefinitely.

Causes and symptoms

Traveling through a few time zones at a time is not as disruptive to circadian rhythms as traveling much greater distances can be. The foremost symptom of jet lag is altered sleep pattern: sleepiness during the day and insomnia during the night. Jet lag may also include **indigestion** and trouble concentrating. Individuals afflicted by jet lag alternate in and out of a normal day-night cycle.

Treatment

Exposure to bright morning sunlight cures jet lag after a few days in most people. A few will have prolonged sleep phase difficulties. For these individuals, there is a curious treatment that has achieved success. By forcing one's self into a 27 hour day, complete with the appropriate stimulation from bright light, all the errant chemical cycles will be able to catch up during one week.

When selecting an international flight, individuals should try to arrange an early evening arrival in their destination city. When people travel to a destination in the east, they can try going to bed and waking up a few hours earlier several days before their flight. If travel is to the west, going to bed and waking up later than usual can help the body start to adjust to the upcoming time change. More specific recommendations are available, tailored to whether individuals are traveling through 6 time zones, 7–9 zones, or 10 or more.

The following precautions taken during an international flight can help to limit or prevent jet lag:

- Stay hydrated. Drink plenty of water and juices to prevent dehydration. Beverages and foods with caffeine should be avoided because of their stimulant properties. Alcohol should also be avoided.
- Stretch and walk. As much movement as possible during a flight helps circulation, which moves nutrients and waste through the body and aids in elimination.
- Stay on time. Set watches and clocks ahead to the time in the destination city to start adjusting to the change.
- Sleep smart. Draw the shade and sleep during the evening hours in the destination city, even if it is still daylight outside the airplane. Earplugs and sleep masks may be helpful in blocking noise and light. Many airlines provide these items on international flights.
- Dress comfortably. Wear or bring comfortable clothes and slippers that will make sleeping during the flight easier.

Upon arrival in the destination city, individuals should spend as much time outdoors in the sunlight as possible during the day to reset their internal clock and lessen the symptoms of jet lag. Bedtime should be postponed until at least 10 p.m., with no daytime naps. If a daytime nap is absolutely necessary, it should be limited to no more than two hours.

To promote a restful sleeping environment in a hotel setting, travelers should request that the hotel desk hold all phone calls. Because sleeping in too late can also prolong jet lag, an early wake up call should be requested if an alarm clock is not available. If the hotel room is noisy, a portable white noise machine can help to block outside traffic and hallway noises. A room air conditioner or fan can serve the same purpose. The temperature in the room should also be adjusted for sleeping comfort.

New information shows that **exercise** at one's destination can also help. When headed westbound, travelers should exercise one hour in the evening. If going eastbound, they do best by exercising in the morning.

All **antioxidants** help to decrease the effects of jet lag. Extra doses of vitamins A, C, and E, as well as **zinc** and **selenium**, two days before and two days after a flight help to alleviate jet lag. Melatonin, a hormone which helps to regulate circadian rhythms, can also aid in combating jet lag. Melatonin is

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available as an over-the-counter supplement in most health food stores and pharmacies. Reports show that the drug is safe for short-term use and recommend 5 mg between 10 p.m. and midnight at the destination to help one fall asleep and sleep better.

If weather prevents an individual from spending time in the sunlight, **light therapy** may be beneficial in decreasing jet lag symptoms. Light therapy, or phototherapy, uses a device called a light box, which contains a set of fluorescent or incandescent lights in front of a reflector. Typically, the patient sits for 30 minutes next to a 10,000-lux box (which is about 50 times as bright as an ordinary indoor light). Light therapy is safe for most people, but those with eye diseases should consult a healthcare professional before undergoing the treatment.

Allopathic treatment

In cases of short-term insomnia triggered by jet lag, a physician may recommend sleeping pills or prescription medication. Such medication should be taken only under the guidance of a healthcare professional.

As of 2008, a melatonin agonist known as LY 156735 was being investigated. An agonist is a drug that stimulates activity at cell receptors that are normally stimulated by such naturally occurring substances as melatonin. LY 156735 was found to speed up the re-adaptation time of volunteer subjects following a simulated 9-hour time shift.

Another area of research in the late 2000s involved the genes that encode the proteins governing circadian rhythms. Evidence suggested that differences among individuals in adaptability to time zone changes are to some extent genetically determined. Targeting the genes that affect this adaptability was hoped to yield new treatments for jet lag and other disorders of circadian rhythm.

Expected results

Jet lag usually lasts 24–48 hours after travel has taken place. In that short time period, the body adjusts to the time change, and with enough rest and daytime exposure to sunlight, it returns to normal circadian rhythm.

Prevention

Eating a high-protein diet that is low in calories before intended travel may help reduce the effects of jet lag.

KEY TERMS

Agonist—A medication that has an affinity for and stimulates the activity of cell receptors that are normally stimulated by naturally occurring substances, such as melatonin.

Circadian—Pertaining to biological rhythms occurring at approximately 24-hour intervals. Jet lag is caused by a disruption of the human body's circadian clock.

Hormone—A chemical made in one part of the body that has an effect on another part.

Melatonin—A hormone that helps to regulate circadian rhythms.

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American Academy of Sleep Medicine, One Westbrook Corporate Center, Suite 920, Westchester, IL, 60154, (708) 492-0930, http://www.aasmnet.org/.

National Sleep Foundation, 1522 K St. NW, Suite 500, Washington, DC, 20005, (202) 347-3471, http://www.sleepfoundation.org/.

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Jew's myrtle *see* **Butcher's broom**

Jock itch

Definition

Also known as *tinea cruris*, jock itch is a growth of fungus in the warm, moist area of the groin.

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Jock itch. *(© Custom Medical Stock Photo / Alamy)*

KEY TERMS

Bupleurum—An Asian plant used in traditional Chinese and Japanese medicines to treat infected or inflamed skin.

Saikosaponins—Chemical compounds found in bupleurum that have anti-inflammatory effects.

Tinea—A term that refers to any of several fungal infections of the skin, especially ringworm.

Tinea cruris—The medical term for jock itch.

Description

Fungal infections are named for the affected part of the body. *Cruris* is derived from the Latin word for leg, hence *Tinea cruris*, for the fungal rash affecting the area where the leg joins the pelvis. Fungi seem to thrive in dark, moist places. Jock itch has been found most often in males, especially those who wear athletic equipment and are exposed to public showers and locker rooms. It is also thought that some fungal **infections** may be spread by towels that may be inadequately cleansed between gym/spa users, but this has not been clearly documented.

Fungal infections can invade or spread to various other areas of the body, and are named for the affected body part. For example, *Tinea capitis* is a fungal infection of the head, usually resulting in red, itchy areas that destroy the hair in the affected area. A fungal infection of the skin on the arms, legs or chest is called *Tinea corporis*. **Athlete's foot** or *Tinea pedis* is a fungal infection in the moist skin fold between the toes. Fungal infection affecting the toenails is called *Tinea ungium*, and causes thickened, crumbly toenails.

Causes and symptoms

The mode of transmission of fungal infections is not clear, but it seems that some individuals are more prone to development of the infection than others. An average of one in five people develops fungal infection at some point during their lifetime. Fungal infection can also be carried by household pets, such as cats and dogs, or by farm animals. In animals, fungal infection manifests itself as a missing area of fur. In humans, as the fungus grows, it spreads to surrounding tissues in a circular fashion, with the skin in the middle returning to a normal appearance. The borders of the affected area may look red and scaly, and the individual may complain of intense **itching** and/or burning. Because the borders develop a raised appearance, there may appear to be a worm beneath the skin and be referred to as ringworm. There is, however, no worm affecting the skin or underlying tissue in cases of fungal infections, including jock itch.

Diagnosis

Often a case of jock itch can be identified based on the characteristic description previously described. If assessed by a conventional doctor, the area of affected skin may be scraped onto a glass slide for definitive diagnosis under the microscope. In order to determine the exact type of fungus present, a small piece of affected skin may be sent to a laboratory for further study or cultured via scraping.

Treatment

Topical treatments include poultices of **peppermint**, oregano, or **lavender**. **Tea tree oil**, diluted with a carrier oil of almond oil, can be applied to the rash several times per day. Cedarwood and jasmine oils can relieve itching when applied in the same manner. **Grapefruit seed extract** can be taken as a strong solution of 15 drops in 1 oz of water.

Bupleurum, or **Chinese thoroughwax**, is an Asian plant that has been used in **traditional Chinese medicine** and Japanese Kampo formulations to treat jock itch and other fungal skin infections. Bupleurum contains compounds known as saikosaponins, which have anti-allergic and anti-inflammatory effects.

A good remedy for jock itch is to wash the groin area with the diluted juice of a freshly squeezed lemon, which can help dry up the rash. A hair dryer on the cool setting can also be used on the area after showering to dry it thoroughly. A warm bath relieves itching in many patients. The affected area should kept clean and dry, and patients are advised to wear loose-fitting

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pure cotton underwear. Fabrics that contain polyester or nylon hold moisture against the body.

Allopathic treatment

Typical conventional treatment for jock itch involves the use of an antifungal cream, spray, or powder twice a day for about two weeks. Two commonly used over-the-counter antifungal preparations are *clotrimazole* (Lotrimin) and *tolnaftate* (Tinactin). While the tendency to discontinue treatment once itching disappears is common, patients should use the antifungal preparation for a full two-week course in order to prevent recurrence of the infection. Doctors recommend continuing the treatment for a full week following clinical clearance of the infection.

Expected results

Most tinea infections resolve without scarring or spread of infection below the skin's surface. Inflammation, however, may require the use of a combination antifungal/steroid medication.

Prevention

Careful attention to skin hygiene, including the maintenance of clean, dry, and intact skin, is the most important step in preventing the development of fungal infection. Light clothing should be worn during warm weather, to decrease perspiration and allow dissipation of body heat. Clean and dry cotton underwear will wick perspiration away from the skin, and prevent jock itch from developing. Use baby powder to keep the area dry during **exercise**. Do not share towels at the gym. Dietary measures discussed under treatment will also prevent initial fungal infection and/or recurrence.

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American Association of Oriental Medicine. 5530 Wisconsin Avenue, Suite 1210, Chevy Chase, MD 20815. (301) 941-1064. www.aaom.org.

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Jojoba oil

Description

Jojoba (pronounced ho-ho-ba) oil is a vegetable oil obtained from the crushed bean of the jojoba shrub (*Simmondsia chinenis*). The jojoba shrub is native to the Sonoran Desert of northwestern Mexico and neighboring regions in Arizona and southern California. It grows in dense stands throughout that region. The woody evergreen shrub may reach 15 ft (4.5 m) in height. Jojoba has flat gray-green leathery leaves and a deep root system that make it well adapted to desert heat and drought. It has a life span of 100–200 years, depending on environmental conditions. Jojoba grows best in areas with 10–18 in (25–45 cm) of annual rainfall where temperatures seldom fall below 25°F (-4°C) for more than a few hours at night. It can grow on many types of soils, including porous rocks, in slightly acid to alkaline soils, and on mountain slopes or in valleys.

Jojoba shrubs are dioecious, meaning plants are either male (staminate), producing pollen, or female (pistillate), producing flowers. The small flowers have no odor or petals and do not attract pollinating insects. The flowers are pollinated by wind in late March; the flowers develop into fruit by August, with full maturation occurring by October. The green fruit dries in the desert heat, its outer skin shriveling and pulling back to expose a wrinkled brown soft-skinned seed (referred to as a nut or bean) the size of a small olive. These nuts, which resemble coffee beans, contain a vegetable oil that is clear and odorless but less oily to the touch than traditional edible oils. The oil comprises half of the weight of the nut. There are about 1,700 seeds in a pound; 17 lb (6.3 kg) of jojoba seeds are required to produce one gallon of oil.

Native Americans have used jojoba for hundreds of years. In the 1700s, Father Junipero Serra, the founder of 21 California missions, noted in his diary

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that the Native Americans were using the oil and the seeds for many different purposes: for treating sores, **cuts**, **bruises**, and **burns**; as a diet supplement and as an appetite suppressant when food was not available; as a skin conditioner, for soothing windburn and **sunburn**; as a cooking oil; as a hair or scalp treatment and hair restorative; and as a coffee-like beverage by roasting the seeds.

The chemical structure of jojoba oil is different from that of other vegetable oils. Rather than being an oil, it is actually is a polyunsaturated liquid wax that is similar to sperm whale oil, though without the fishy odor. It is made of fatty acids as well as esters composed entirely of straight chain alcohols. Both the acid and alcohol portions of jojoba oil have 20 or 22 carbon atoms, and each has one unsaturated bond. Waxes of this type are difficult to synthesize. As a wax, jojoba oil is especially useful for applications that require moisture control, protection, and emolliency. Jojoba oil is liquid at room temperature because of its unsaturated fatty acids. It does not oxidize or become rancid and does not break down under high temperatures and pressures. Jojoba oil can be heated to 370°F (188°C) for 96 hours without exhibiting degradation in general composition and carbon chain length. The stability shown by jojoba oil makes it especially useful for cosmetic applications.

When the United States banned the use of sperm whale oil (spermaceti wax) in 1974, the government began to fund efforts to investigate and cultivate jojoba as a replacement. Jojoba oil was found to be an adequate substitute for applications that had previously used sperm whale oil. The first commercial cultivation of jojoba was in the Negev Desert and Dead Sea areas of Israel, but by 1977, domestic cultivation had begun in the United States. In 2000, the International Jojoba Export Council expected the global jojoba production to increase 15% over a five-year period.

General use

Jojoba oil has many uses in a wide variety of industries. As a cosmetic, it is an effective cleanser, conditioner, moisturizer, and softener for the skin and hair. It is applied directly to the skin to soften the skin, to reduce wrinkles and stretch marks, to lighten and help heal scars, and to promote healthy scalp and hair. Jojoba oil is similar to, and miscible with, sebum, which is secreted by human sebaceous glands to lubricate and protect skin and hair. When sebum production decreases due to age, pollutants, or environmental stresses, jojoba oil can be used to replicate sebum oil. Jojoba oil can accumulate around hair roots, thereby conditioning hair and preventing it from becoming brittle and dull. If there is too much sebum buildup on the scalp, it dissolves and removes the sebum, leaving the hair clean. Jojoba oil as a solubilizing agent can also remove sticky buildup on hair from hair preparations as well as airborne particulates deposited on the hair. It forms a lipid layer on the skin, acting as a moisturizer, as well as penetrating and being absorbed by the outer layer of skin. It is widely used as an ingredient in shampoos, conditioners, facial, hand and body lotions, cuticle and nail care products, baby care lotions, creams, and oils, cleansers, moisturizers, bath oils and soaps, sunscreen lotions, and makeup products. Jojoba oil is also used as a base in the manufacture of perfume.

KEY TERMS

Noncomedogenic—A substance that contains nothing that would cause blackheads or pimples to form on the skin. Jojoba oil is noncomedogenic.

The potential therapeutic uses of jojoba oil include the treatment of **acne**, cold sores, and such skin diseases as **psoriasis**.

Jojoba oil is also a registered (licensed for sale) pesticide for use on crops. It is used to control white flies on all crops and powdery mildew on grapes and ornamentals. It is applied as a spray containing 1% or less final concentration of jojoba oil. It acts as a pesticide by forming a physical barrier between an insect pest and the leaf surface. Because of its low toxicity and its rapid degradation in the environment, jojoba oil does not pose a risk to non-target organisms or the environment; though as an oil, it should not be disposed of in lakes or other bodies of water.

Preparations

Jojoba oil is prepared by pressing the jojoba seeds to extract the oil, followed by filtration. It is then pasteurized to ensure product safety. Four grades of jojoba oil are produced: (1) a pure, natural golden grade, a golden-yellow color oil that is produced by the basic production process; (2) refined and bleached jojoba oil, with color removed by bleaching and filtration; (3) a decolorized/deodorized grade, which is used in cosmetics requiring colorless and odorless oils; and (4) a molecular distilled grade, an expensive formulation produced in minimal quantities, with its use having mostly been replaced with decolorized/deodorized jojoba oil.

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Precautions

Jojoba oil is a nontoxic, noncomedogenic (does not clog pores), and hypoallergenic substance. It has been widely used for decades in cosmetics, with no reported adverse effects. If jojoba oil is ingested, most of it is eliminated in the feces, with little getting distributed in the body.

Side effects

No side effects are expected with the use of jojoba oil in recommended amounts, although allergic reactions are a rare possibility.

Interactions

Since jojoba oil does not oxidize or become rancid, it is added to other oils to extend their shelf life.

Resources

BOOKS

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Judith Sims

Journal therapy

Definition

Journal therapy is the purposeful and intentional use of a written record of one's own thoughts or feelings to further psychological healing and personal growth. It is often used as an adjunct to many **psychotherapy** and recovery programs. Healthcare practitioners maintain that written expression fills a very important role in the therapeutic process by providing a mechanism of emotional expression in circumstances in which interpersonal expression is not possible or viable.

Origins

People have kept journals and diaries to record dreams, memories, and thoughts since ancient times. Emotional expression has also long held a central role in the study and practice of psychology. Throughout history, psychologists have advocated the expression of emotions as essential for good mental and physical health. Since the early 1980s, interest in this topic has resulted in numerous research studies investigating the health benefits of expressive writing.

KEY TERMS

Art therapy—The use of art media to assess and treat an individual's development, abilities, personality, interests, concerns, or conflicts.

Psychodyamic—The scientific study of mental or conditional forces developing especially in early childhood and their effect on behavior and mental states.

Benefits

Journal writing produces a number of benefits in healthy people—among other things, it enhances creativity, helps cope with **stress**, and provides a written record of memorable life experiences. Likewise, some researchers have found that journal writing has a number of psychological and physical health benefits for people who are ill.

Aside from a reduction in physical symptoms of disease, the psychological benefits include reconciling emotional conflicts, fostering self-awareness, managing behavior, solving problems, reducing **anxiety**, aiding reality orientation, and increasing self-esteem. Writing therapy has been used as an effective treatment for the developmentally, medically, educationally, socially, or psychologically impaired and is practiced in mental health, rehabilitation, medical, educational, and forensic institutions. Populations of all ages, races, and ethnic backgrounds are served by writing therapy in individual, couple, family, and group therapy formats.

The therapeutic use of expressive writing allows individuals to confront upsetting topics, thus alleviating the constraints or inhibitions associated with not talking about the event. The psychological drain of the inhibition is believed to cause and/or exacerbate stress-related disease processes. Researchers have found that emotional expression facilitates cognitive processing of the traumatic memory, which leads to emotional and physiological change. Specifically, written emotional expression promotes integration and understanding of the event while reducing negative emotions associated with it.

Description

Journal writing and other forms of writing therapy are based on the premise that the mind and the body are inseparably joined in the healing process. Although there are many methods of conducting

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journal writing therapy depending on the therapeutic technique of the psychologist or psychiatrist, the therapist often instructs the participant to write about a distressing or traumatic event or thought in one or more sessions.

Although researchers are uncertain about exactly how writing about traumas produces improvements in psychological well-being, traumatic stress researchers have pointed out that ordinary memories are qualitatively different from traumatic memories. Traumatic memories are more emotional and perceptual in nature. The memory is stored as a sensory perception, obsessional thought, or behavioral reenactment. It is associated with persistent, intrusive, and distressing symptoms, avoidance, and intense anxiety that results in observed psychological and biological dysfunction. Thus, one goal in treating traumatic memories is to find a means of processing them.

A narrative that becomes more focused and coherent over a number of writing sessions is often associated with increased improvement, according to several research studies. The memories become deconditioned and restructured into a personal, integrated narrative. Changes in psychological well-being after writing therapy may result from cognitive shifts about the trauma either during or after the writing process.

Preparations

In a health care setting, the participant often prepares for journal writing by receiving (from the therapist) a set of instructions regarding the length and focus of the writing session or sessions. Other instructions may include writing in a stream-of-consciousness fashion, without censorship or concern about grammar or style.

Precautions

It is advisable that journal therapy be conducted only by a licensed health professional, such as a certified **art therapy** practitioner or trained psychologist or psychiatrist. While journal writing classes available to the general public may perform a variety of useful functions, these classes are not intended to provide medical therapy. In journal therapy, the participant may, for example, uncover potentially traumatic, repressed, or painful memories. Therefore, a trained health professional may be necessary to supervise the process and treat these symptoms as they arise.

Side effects

There are no known side effects of journal or writing therapy.

Research and general acceptance

Therapeutic writing became an increasingly popular topic in the final decades of the twentieth century, not only among trained health care professionals, but also among self-improvement speakers without medical training. Seminars, workshops, and Internet sites purportedly offering therapy though expressive writing sprang up around the nation and gained popular acceptance. Despite the large body of research indicating that writing confers benefits on healthy people, the topic of writing therapy's affects on diseased individuals has not received a great deal of research attention. Although increasingly used by health care professionals as an adjunct to various therapeutic approaches, the practice has been criticized by some members of the health care community. Some researchers are distrustful of the findings that so much measurable improvement in health status can occur in just a few brief writing sessions.

In the United Kingdom, the focus of journal therapy has been on descriptive accounts and psychodynamic explanations for subjective improvements in the health status of participants. In the United States, on the other hand, the focus is on formal scientific research aimed at validating the impact of brief, highly standardized writing exercises on physical measures of illness. The research demonstrates that although physical measures of illness may change, the reasons for the change are not always clear.

In the United States, one study on the effects of writing about stressful experiences on symptom reduction in patients with **asthma** or **rheumatoid arthritis** found that after four months of writing therapy—in conjunction with standard pharmacotherapy—nearly half the patients enrolled in the study experienced clinically relevant improvement. A growing number of studies have documented symptom improvement in patients with psychiatric disorders as well, suggesting that addressing patients' psychological needs produces both psychological and physical health benefits.

Training and certification

Although journal therapy is often provided by certified instructors who receive variable amounts of training in a number of programs around the country, journal therapy is best administered by a licensed psychologist (who may also be an art therapist) or psychiatrist.

Educational, professional, and ethical standards for art therapists who conduct writing therapy are regulated by The American Art Therapy Association, Inc. The American Art Therapy Credentials Board,

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Inc., an independent organization, grants postgraduate supervised experience. A registered art therapist who successfully completes the written examination administered by the Art Therapy Credentials Board qualifies as Board Certified (ATR-BC), a credential requiring maintenance through continuing education credits.

Resources

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ORGANIZATIONS

The American Art Therapy Association. 1202 Allanson Road. Mundelein, IL 60060-3808. *http://www.arttherapy.org.*

The Center for Journal Therapy. 12477 W. Cedar Drive, #102. Lakewood, CO 80228. http://www.journaltherapy.com.

Genevieve Slomski

Juice therapies

Definition

Juice therapy involves the consumption of the juice of raw fruit or vegetables. A person may drink juice preventively to stay healthy, to treat a medical condition such as **cancer**, or to produce a certain outcome, such as strengthening the immune system. Three widely practiced juice therapies differ primarily in the amount of time that a person is involved in the therapy and whether other items are included in the person's diet.

Vitamins and minerals found in juices

Type of juice	Vitamins and minerals
Apple	Chromium, selenium, vitamin C
Asparagus	Folic acid, potassium, vitamins A, B_6, C, and K
Bok choy	Calcium
Broccoli	Folic acid, phosphorus, potassium, vitamins A, B_6, C, E, and K
Brussel sprouts	Folic acid, potassium, thiamine, vitamins B_6, C, and K
Cabbage	Calcium, chromium, manganese, vitamins B_6 and C
Cantaloupe	Beta-carotene, potassium, vitamin C
Carrots	Beta-carotene, zinc
Celery	Potassium, vitamins B_1, B_2, B_6, and C
Citrus fruits	Vitamin C
Collard greens	Calcium, vitamin K
Garlic	Manganese, selenium, vitamin B_6
Ginger	Zinc
Green peas	Zinc
Kale	Calcium, folic acid, vitamins B_6 and K
Orange	Folic acid, potassium, vitamin C
Papaya	Beta-carotene, vitamin A, C, and E
Peppers	Vitamin C
Spinach	Vitamins B_6 and E
Sweet peppers	Chromium
Tomatoes	Carotenes (especially lycopene), folic acid, niacin, vitamins C and K
Turnip	Calcium, copper, folic acid, manganese selenium, vitamin C
Turnip greens	Calcium, folic acid, manganese, vitamins B_6, C, and E

*Selenium amounts in plant foods vary greatly depending on the amount in the soil in which the plants are grown.

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For some people, adding fresh juice to their daily meal plan is sufficient. Others will embark on a juice fast for several days to cleanse their systems. Juice is also a major component of the so-called **Gerson therapy** diet that is used to treat cancer. This therapy usually starts with a stay of three to eight weeks in a clinic. Then therapy continues at home and may continue for years.

Origins

Fasting and juice consumption

The two components of most juice therapies, **fasting** and juice consumption, date back thousands of years. Fasting is a long-standing religious tradition described in the Bible and other ancient writings. The medicinal use of juice can be traced back thousands of years to India. Proponents of **Ayurvedic medicine**, a healing system, believed that drinking juice strengthens body tissues.

In the centuries that followed, people continued to recognize that eating fruit and vegetables produced health benefits. Much folklore and many sayings developed around the benefits of fruits and vegetables. Carrots were said to improve eyesight; and according to the adage, "An apple a day keeps the doctor away." During the twentieth century, fruit and vegetables became important components of healing therapy.

Gerson juice diet

During the 1940s, a German doctor, Max B. Gerson, developed a therapy using juice to treat his migraine headaches. He developed the therapy further and recommended it to people diagnosed with migraines, arthritis, **tuberculosis**, and cancer. His diet was based on the theory that excess **sodium** in a person's system disrupts the immune system and the functions of the liver, pancreas, and thyroid gland. Gerson developed a low-salt organic diet that focused on raw vegetable and fruit juices. The diet included nutritional supplements and coffee enemas, which he claimed, detoxified the liver and relieved **pain**. Since the therapy worked for Gerson, he recommended it to patients.

Advocates of juice therapies maintain that refraining from eating solid food boosts the body's ability to heal itself. Since the body is not spending time and energy on digesting complex high-fat food, it can concentrate on healing instead. Advocates also believe that all-juice **diets** can help the body eliminate toxins (poisons). This reasoning is typically the basis put forth in support of juice fasts.

Juicing

Another form of juice therapy known as juicing involves extracting the juice from raw fruit and vegetables. From the 1970s on, people like "Juiceman" Jay Kordich popularized the concept of drinking fresh juice to boost energy, lose weight, and achieve other health benefits. Kordich provided recipes and sold juice extractors that are also known as "juicers."

Kordich toured the country and talked about juice ingredients that seemed exotic to a public used to tomato juice and orange juice. He presented suggestions for new juice combinations, such as juiced potato, apple, carrot, and **parsley**. Kordich even provided various recipes that were aimed at producing specific results, such as weight loss or increased vitality. Through his infomercials and presentations, as well as those of other people who followed in his footsteps, the public became much more conscious of juice and its potential health benefits. One outgrowth of the interest in juices has been the establishment of chain stores such as Jamba Juice that sell primarily juice drinks.

Benefits

Research has shown that a diet rich in fresh fruits and vegetables reduces the risk of such chronic diseases such as **heart disease** and diabetes. This diet is also believed to reduce the risk of developing cancer. Furthermore, raw vegetables and fruit contain vitamins, food enzymes, minerals, **amino acids**, and natural sugars. Some of those nutrients are altered or lost in commercial juices sold in stores because, with few exceptions, these juices must be pasteurized (heat treated) to prevent spoilage. According to juice therapy advocates, however, the benefits of fresh juices extend beyond their nutritional content.

Proponents of juice therapies continue to study its benefits. In 2002, a physician reported to the American College of Cardiology that two cups of orange juice daily significantly lowered the blood pressure of hypertensive patients. A British study in the same year verified the positive effects of **cranberry** juice on urinary tract **infections**.

Juice is used in Ayurvedic treatment for such conditions as arthritis, **anemia**, and **constipation**. Juice is also a component of naturopathy, which is also known as the "whole body cure." A naturopathic doctor may prescribe a juice fast as part of treatment for arthritis, cancer, or **AIDS**. Supporters of juice fasting believe that the process releases a hormone that helps the body fight disease so that a juice fast strengthens the immune system. The fast also allows the naturopathic

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physician to identify food sensitivities (allergens) as the patient begins eating food.

Juice fasting is also a part of **detoxification** therapy. It is part of the Gerson diet, a cancer therapy said to eliminate the build-up of toxins in the body by stimulating enzymes, improving the digestive system, and providing the correct balance of vitamins and minerals.

Description

Juice therapy can be as simple as extracting the juice from raw produce or as complicated as the Gerson diet. The therapies vary in the amount of commitment involved and the cost. Whether a therapy is covered by medical insurance will depend on the health plan. The costs of juicing or fasting at home are generally not covered. A juice fast administered as part of another treatment by a doctor or other health care provider might be covered. For Gerson therapy, some companies pay for part or all of the costs, according to the Gerson Institute Web site. Individuals interested in therapeutic juice fasting as part of treatment for a specific disease should check with their insurance company about coverage.

Gerson therapy

The Gerson therapy treatment was originally administered at a Gerson therapy clinic. Today, the institute does not operate facilities; instead since 1999, it has licensed such facilities as the Oasis of Hope Hospital in Tijuana, Mexico. The Gerson therapy treatment is based on drinking freshly pressed vegetable and fruit juice every hour. During a typical day at a Gerson clinic, a person would drink 13 glasses of raw carrot/apple and green-leaf vegetable juices. Vegetarian meals of organically grown food are served. During treatment, the patient receives coffee enemas during the evening to detoxify the blood and tissues. A stay at the Oasis of Hope is quite expensive and may not be covered by medical insurance.

Fasting

A juice fast can be undertaken at home with no professional guidance or under the direction of an alternative medicine practitioner such as a naturopathic doctor. The fast could also be part of the program at a retreat center.

Another juice therapy option is a short-term cleansing diet lasting two to three days. One popular fast involves consumption of fruit and vegetable juice for several days. In some plans, herbal tea and broth are allowed. Another variation is the raw food diet, which involves eating uncooked fruit and vegetables. Advocates claim the diet is useful in treating such conditions as heart disease and arthritis.

Juicing

Juicing involves the extraction of juice from raw fruit or vegetables. An extractor, fresh produce, and a commitment of time to juice the items are required. A blender is not strong enough to juice produce. Juice extractors are priced from about $120–$2,000. Juice should be consumed as soon as possible after extraction. When it is stored, juice loses some of its nutritional value.

BENEFICIAL JUICES. While most people know that orange juice is rich in **vitamin C**, the juices of other produce are believed to provide other health benefits. The wide selection of juices offers benefits that include the following:

- An 8-oz (240 ml) glass of carrot juice contains more than 10 times the recommended daily allowance of vitamin C.
- Fresh fruit and vegetable juices, including wheatgrass juice, are consumed for ulcers. Ulcer remedies include raw potato juice for peptic ulcers. For a duodenal ulcer, raw cabbage juice can be mixed with carrot and celery juice.
- Cranberries help prevent and treat urinary infections.
- Beet juice can be diluted to stimulate the liver.
- Garlic lowers the blood pressure and cholesterol.
- Cantaloupe juice can be consumed for stress.

Preparations

Individuals should consult a doctor or nutritionist before beginning a fast or treatment such as Gerson therapy. The medical professional can determine whether it is safe for the individual to undertake the fast, and recommend duration for the fast. The individual should also discuss with his or her healthcare provider any warning signs that indicate health problems are developing from the therapy. Prolonged fasting can be dangerous and knowing the signs of a possible problem can help prevent serious health consequences.

Precautions

Some precautions should be taken with each form of juice therapy. Juicing removes much of the necessary dietary fiber found in fruits and vegetables. Since an adult diet should contain 20–25 g of fiber per day, a person relying heavily on juice should find other sources of dietary fiber. Another caution is that carrot

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greens, rhubarb greens, and apple seeds can be toxic and should not be juiced.

Some health professionals advise against fasting, a process they say can produce weakness, **fatigue**, anemia, and other conditions. Other health professionals believe that fasts are safe, but should not be undertaken by pregnant women, people who are diabetic, and those who have ulcers or a heart condition. In some cases, the doctor or practitioner may advise a supervised fast.

Another potential problem with juicing fresh fruit and some vegetables is that it can lead to the intake of considerable amounts of sugar. In some people, the sugar produces a quick rush of energy followed by a "crash." Although drinking juice can help individuals ensure that they get the recommended amounts of fruit and vegetables each day, consuming large amounts of fruit juice can lead to excessive sugar intake which can cause weight gain and increase the risk of type 2 diabetes.

Critics of the Gerson diet say that it has many dangerous side effects, including dehydration, electrolyte imbalance, constipation, infection, poor resistance to disease, excessive weight loss, inflammation of the colon, and in some cases even death. A person diagnosed with cancer should never undertake Gerson therapy instead of conventional cancer treatments such as chemotherapy. As of 2008, there were only two licensed Gerson centers in the world, 10-bed center in Tijuana, Mexico and a 3-bed center in California.

Side effects

The side effects of fasting can include weight loss, mental confusion, fatigue, electrolyte imbalance, constipation, **diarrhea**, and dehydration.

In Gerson therapy, diarrhea and **nausea** are considered part of the healing process. During the treatment, a person may experience flu-like symptoms, loss of appetite, weakness, and **dizziness**. Other side effects may include **feverblisters**, perspiration and **body odor**, intestinal cramping, and a painful feeling in tumors.

Research and general acceptance

The Gerson diet is highly controversial. Individuals who are proponents of the therapy have come forward with some studies they claim to be proof of its effectiveness. Members of the medical community have criticized these studies, however, for involving too few subjects, not being reproducible, and other methodological problems. According to the American Cancer Society, available scientific evidence does not support the health claims made by Gerson therapy practitioners. The Gerson diet is classified by the National Cancer Institute as not medically proven and potentially unsafe.

Both alternative and traditional medical practitioners accept the benefits of eating a diet that includes a wide variety of many different fruits and vegetables. Juicing, as part of a balanced, healthy diet, can be an excellent way for individuals to include fruits and vegetables in their diet. Juice fasts, however, especially those of long duration, are not widely accepted as beneficial, and many medical professionals warn against their potential dangers.

KEY TERMS

Ayurvedic medicine—A 5,000-year old system of holistic medicine developed on the Indian subcontinent. Ayurvedic medicine is based on the idea that illness results from a personal imbalance or lack of physical, spiritual, social, or mental harmony.

Training and certification

Although there is no official training in juice therapy as such, those who administer it may have training and certification in other disciplines. A naturopathic doctor or medical doctors will have medical training. Individuals staffing the Gerson Clinics have been trained in Gerson therapy. A trained nutritionist or dietitian may recommend juicing as a way to include more fruits and staffers at Gerson Clinics have been trained in that therapy.

Resources

BOOKS

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Kiani, Jawad, and Sadar Z. Imam. "Medical Importance of Grapefruit Juice and its Interaction with Various Drugs." *Nutrition Journal* 6.33 (October 30, 2007): 33.

ORGANIZATIONS

American Holistic Medical Association, PO Box 2016, Edmonds, WA, 98020, (425) 967-0737, http://www.holisticmedicin.org.

American Cancer Society, 1599 Clifton Road NE, Atlanta, GA, 30329-4251, (800) ACS-2345, http://www.cancer.org.

Gerson Institute, 1572 Second Avenue, San Diego, CA, 92101, (800) 838-2256, http://www.gerson.org.

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KEY TERMS

Diuretic—A substance that promotes urination.

Infusion—An herbal tea created by steeping herbs in hot water. Generally, leaves and flowers are used in infusions.

Sitz bath—A bath in which only the hips and buttocks are soaked.

Stomachic—A substance that increases the appetite.

Juniper

Description

Juniper (*Juniperus communis*) is an evergreen shrub found on mountains and heaths throughout Europe, Southwest Asia, and North America. The tree grows to a height of 6-25 ft (2-8 m) and has stiff, pointed needles that grow to 0.4 in (1 cm) long. The female bears cones that produce small, round, bluish black berries, which take three years to fully mature.

Juniper belongs to the pine family (Cupressaceae). Juniper has diuretic, antiseptic, stomachic, antimicrobial, anti-inflammatory, and antirheumatic properties. The tree's therapeutic properties stem from a volatile oil found in the berries. This oil contains terpenes, flavonoid glycosides, tannins, sugar, tar, and resin. Terpinen-4-ol (a diuretic compound of the oil) stimulates the kidneys, increasing their filtration rate. The flavonoid amentoflavone exhibits antiviral properties. Test tube studies show that another constituent of juniper, desoxypodophyllotoxins, may act to inhibit the herpes simplex virus. The resins and tars contained in the oil benefit skin conditions such as **psoriasis**.

For more than 300 years, juniper berries have been a popular flavoring agent for gin. The word gin comes from the Dutch word for juniper, "geniver." In addition to being an ingredient in alcohol, juniper also has medicinal properties. Ancient Egyptian doctors used the oil as a laxative as far back as 1550 B.C. The Zuni Native American people used the berries to assist them in **childbirth**. Other Native Americans gathered juniper berries and leaves to treat **infections**, arthritis, and **wounds**. British herbalists used juniper to promote **menstruation**. Nineteenth-century American herbalists used juniper as a remedy for congestive heart failure, **gonorrhea**, and urinary tract infections.

Juniper has also been used as a traditional remedy for **cancer**, arthritis, **gas**, **indigestion**, **warts**, **bronchitis**, **tuberculosis**, **gallstones**, **colic**, heart failure, intestinal disease, **gout**, and back **pain**. The berries were often eaten to relieve rheumatism or to freshen bad breath. When treating patients, doctors often chewed juniper berries to prevent infection.

General use

Modern herbalists prescribe juniper to treat bladder infections, kidney disease, chronic arthritis, gout, rheumatic conditions, fluid retention, cystitis, skin conditions, inflammation, digestive problems, menstrual irregularities, and high blood pressure. The German Commission E has approved juniper berries for use in treating **heartburn** and dyspepsia (indigestion), belching, and other digestive disturbances.

Juniper is a powerful diuretic. The volatile oil contained in juniper is composed of compounds that stimulate the kidneys to remove fluid and bacterial waste products from the body. This is useful in conditions such as congestive heart failure, urinary infections, and kidney disease.

The oil also has antiseptic properties, which makes it a useful disinfectant treatment for urinary and bladder infections. The German Commission E reported that juniper caused an increase in urine flow

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and smooth muscle contractions. Juniper may be combined with other herbs such as **uva ursi**, **parsley**, cleavers, or **buchu** to treat bladder infections. In fact, juniper may help treat bladder infections more effectively when combined with other herbs.

Juniper's anti-inflammatory properties help to relieve the inflammation, stiffness, and pain that are present in conditions like arthritis, rheumatism, and gout. The berries can be made into an ointment and rubbed on the affected joints and muscles. The tree needles may be crushed and added to a bath to ease aching muscles. Some people may find relief from the nerve, muscle, joint, and tendon pains of gout and **rheumatoid arthritis** by applying a compress made from an infusion of juniper berries.

Juniper is also warming to the digestive system and increases the production of stomach acid, stimulates the appetite, settles the stomach, and relieves gas.

A steam distillation process is used to extract the essential oil of juniper from the ripe, dried berries. This aromatic oil has a light, fruity fragrance that is psychologically uplifting during periods of low energy, **anxiety**, and general weakness. Applied topically, essential oil of juniper has a warming effect on the skin and helps to promote the removal of fluid and waste products from tissues. External applications also help relieve sore muscles, joint and lower back pain, and can be used to clear up **acne**, **eczema**, and **varicose veins**. To stimulate menstruation, juniper oil can be added to a carrier oil and used in a sitz bath or massage. Steam inhalation of the essential oil may also help relieve coughs and lung conditions such as bronchitis.

Consumers should use juniper oil sparingly and should not use more than the recommended dose. Six or more drops of juniper oil can have a toxic effect. Any **aromatherapy** essential oil should be diluted in a carrier oil such as almond or grapeseed oil before external use.

Preparations

The ripe, mature berries and needles from the tree are used in herbal medicine. Juniper is available in bulk form as whole berries, or as a supplement in the form of capsules or tinctures.

The recommended tincture dosage is 10-20 drops four times daily.

Teas are often taken to relieve digestive problems. To make a tea, 1 cup of boiling water is poured over 1 tablespoon of juniper berries. The mixture is covered and steeped for 10-20 minutes. One cup can be drunk two times daily. The tea should not be used for longer than two weeks at a time. A clean cloth may be soaked in the cooled mixture to create a compress.

Precautions

Juniper should be used only for short periods of time. High doses or prolonged use of juniper may irritate the kidneys and urinary tract, causing damage. People with kidney problems should not use this herb.

Juniper stimulates contractions of the womb. Pregnant women should not use juniper. Breastfeeding women also should not use juniper.

Juniper may increase blood sugar levels in diabetics. Therefore, diabetics should consult with their doctor before using juniper.

When taking juniper for a **bladder infection**, consumers should see their doctor if the infection is still present after several days of use, or if lower back pain, **fever**, or **chills** develop.

Side effects

External application of juniper oil may cause a skin rash.

People with **allergies** may experience allergy symptoms such as nasal congestion.

Side effects of juniper overdose include **diarrhea**, purplish urine, blood in the urine, kidney pain, intestinal pain, elevated blood pressure, and a quickened heartbeat. If these effects occur, consumers should stop taking juniper and call their doctor immediately.

Interactions

Consumers should use juniper cautiously with other diuretic drugs or substances because excessive fluid loss may occur.

Resources

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Jennifer Wurges

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Juvenile rheumatoid arthritis

Definition

Juvenile **rheumatoid arthritis** (JRA) includes a number of different conditions, all of which affect children and all of which have immune-mediated joint inflammation as their major manifestation. JRA is also known as juvenile idiopathic arthritis or JIA. The European League Against Rheumatism (EULAR) refers to the disorder as juvenile chronic arthritis (JCA).

Description

The skeletal system of the body is made up of different types of strong, fibrous material known as connective tissue. Bone, cartilage, ligaments, and tendons are all forms of connective tissue that have different compositions and different characteristics.

The joints are structures that hold two or more bones together. Some joints (synovial joints) allow for movement between the bones being joined (articulating bones). The simplest model of a synovial joint involves two bones, separated by a slight gap called the joint cavity. The ends of each articular bone are covered by a layer of cartilage. Both the articular bones and the joint cavity are surrounded by a tough tissue called the articular capsule. The articular capsule has two components: the fibrous membrane on the outside, and the synovial membrane (or synovium) on the inside. The fibrous membrane may include tough bands of fibrous tissue called ligaments, which are responsible for providing support to the joints. The synovial membrane has special cells and many capillaries (tiny blood vessels). This membrane produces a supply of synovial fluid that fills the joint cavity, lubricates it, and helps the articular bones move smoothly about the joint.

In JRA, the synovial membrane becomes intensely inflamed. Usually thin and delicate, the synovium becomes thick and stiff, with numerous infoldings on its surface. The membrane becomes invaded by white blood cells, which produce a variety of destructive chemicals. The cartilage along the articular surfaces of the bones may be attacked and destroyed, and the bone, articular capsule, and ligaments may begin to be worn away (eroded). These processes severely interfere with movement in the joint.

JRA specifically refers to chronic arthritic conditions that affect a child under the age of 16 years and that last for a minimum of three to six months. JRA is often characterized by a waxing and waning course, with flares separated by periods of without noted symptoms (remission). Some literature refers to JRA as juvenile rheumatoid arthritis, although most types of JRA differ significantly from the adult disease called rheumatoid arthritis, in terms of symptoms, progression, and prognosis.

Demographics

JRA is the most common chronic inflammatory disease in children, affecting about 50,000 children in the United States.

Causes and symptoms

A number of different causes have been sought to explain the onset of JRA. There appears to be a genetic link; the tendency to develop JRA sometimes runs in particular families, and certain genetic markers are more frequently found in patients with JRA and other related diseases. Research has shown that several autoimmune diseases, including JRA, share a common genetic link. In other words, patients with JRA might share common genes with family members who have other autoimmune diseases such as rheumatoid arthritis, systemic lupus, **multiple sclerosis**, and others.

Many researchers have looked for some infectious cause for JRA, but no clear connection to a particular organism has ever been made. JRA is considered by some to be an autoimmune disorder. Autoimmune disorders occur when the body's immune system mistakenly identifies the body's own tissue as foreign and attacks those tissues, as if trying to rid the body of an invader (such as a bacteria, virus, or fungi). While an autoimmune mechanism is strongly suspected, certain markers of such a mechanism (such as rheumatoid factor, often present in adults with such disorders) are rarely present in children with JRA.

Joint symptoms of arthritis may include stiffness, **pain**, redness, warmth of the joint, and swelling. Bone in the area of an affected joint may grow too quickly or too slowly resulting in limbs that are of different lengths. When the child tries to avoid moving a painful joint, the muscle may begin to shorten from disuse, which is called a contracture.

Symptoms of JRA depend on the particular subtype. According to criteria published by the American College of Rheumatology (ACR) in 1973 and modified in 1977, JRA is classified by the symptoms that appear within the first six months of the disorder:

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- Pauciarticular JRA: The most common and the least severe type of JRA, affecting about 40–60% of all JRA patients, pauciarticular JRA affects fewer than four joints, usually the knee, ankle, wrist, and/or elbow. Other more general (systemic) symptoms are usually absent, and the child's growth usually remains normal. Very few children (less than 15%) with pauciarticular JRA end up with deformed joints. Some children with this form of JRA experience painless swelling of the joint. Others have a serious inflammation of structures within the eye, which if left undiagnosed and untreated could lead to blindness. This condition, known as uveitis, affects about 20% of children diagnosed with JRA. While many children have cycles of flares and remissions, in some children the disease completely and permanently resolves within a few years of diagnosis.
- Polyarticular JRA: About 50% of all cases of JRA are of this type. Polyarticular JRA is most common in children up to age three or after the age of 10 and affects girls more often than boys. Polyarticular JRA affects five or more joints simultaneously. This type of JRA usually affects the small joints of both hands and both feet, although other large joints may be affected as well. Some patients with arthritis in their knees experience a different rate of growth in each leg. Ultimately, one leg grows longer than the other. About half of all patients with polyarticular JRA have arthritis of the spine and/or hip. Others with polyarticular JRA have other symptoms of a systemic illness, including anemia (low red blood cell count), decreased growth rate, low appetite, low-grade fever, and a slight rash. The disease is most severe in those children who are diagnosed in early adolescence. Some of these children test positive for rheumatoid factor (RF), a marker present in other autoimmune disorders. RF is found in adults who have rheumatoid arthritis. Children who are positive for RF tend to have a more severe course, with a disabling form of arthritis that destroys and deforms the joints. This type of arthritis is thought to be the adult form of rheumatoid arthritis occurring at a very early age.
- Systemic onset JRA: Sometimes called Still's disease (after a physician who originally described it), this type of JRA occurs in about 10% of children with arthritis. Boys and girls are equally affected, and diagnosis is usually made between the ages of five and 10. The initial symptoms are not usually related to the joints. Instead, these children have high fevers; a rash; decreased appetite and weight loss; severe joint and muscle pain; swollen lymph nodes, spleen, and liver; and serious anemia. Some children experience other complications, including inflammation of the sac containing the heart (pericarditis), inflammation of the tissue lining the chest cavity and lungs (pleuritis), and inflammation of the heart muscle (myocarditis). The eye inflammation often seen in pauciarticular JRA is uncommon in systemic onset JRA. Symptoms of actual arthritis begin later in the course of systemic onset JRA, and they often involve the wrists and ankles. Many of these children continue to have periodic flares of fever and systemic symptoms throughout childhood. Some children go on to develop a polyarticular type of JRA.
- Spondyloarthropathy: This type of JRA most commonly affects boys aged eight years and older. The arthritis occurs in the knees and ankles, moving over time to include the hips and lower spine. Inflammation of the eye may occur occasionally but usually resolves without permanent damage.
- Psoriatic JRA: This type of arthritis usually shows up in fewer than four joints but goes on to include multiple joints (appearing similar to polyarticular JRA). Hips, back, fingers, and toes are frequently affected. A skin condition called psoriasis accompanies this type of arthritis. Children with this type of JRA often have pits or ridges in their fingernails. The arthritis usually progresses to become a serious, disabling problem.

Diagnosis

Diagnosis of JRA is often made on the basis of the child's collection of symptoms. Laboratory tests often show normal results. Some nonspecific indicators of inflammation may be elevated, including white blood cell count, erythrocyte sedimentation rate, and a marker called C-reactive protein. As with any chronic disease, **anemia** may be noted. Children with an extraordinarily early onset of the adult type of rheumatoid arthritis have a positive test for rheumatoid factor.

Treatment

Range-of-motion and muscle-strengthening exercises are among the best natural therapies for JRA. Research has shown that **exercise** can decrease inflammatory agents while increasing anti-inflammatory compounds in the body, thereby improving immune function. However, physical activity can be challenging when patients are experiencing symptoms of pain. Physical or occupational therapists can provide supervised exercises to teach proper technique, and these exercises should be practiced as recommended at home.

To reduce morning stiffness, the child can take a hot bath or shower or apply a heating pad.

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Diet is also believed to play a role in treating JRA. A number of autoimmune disorders, including JRA, seem to have a relationship to food **allergies**. Patients may experience symptom relief after identifying and eliminating food allergens from the diet, which can trigger inflammation. Following a diet low in saturated fats may also help reduce the inflammatory response, which can be increased by a diet high in saturated fats. A strict vegetarian diet low in fats and free of glutens may also be helpful. Including foods rich in **calcium** and **vitamin D** is also important to build bone mass and reduce the risk of **fractures**.

Massage has been shown to benefit children with JRA by reducing **anxiety** and **stress**, reducing pain, and reducing morning stiffness.

Alternative treatments that have been suggested for arthritis include juice therapy, which can work to detoxify the body, helping to reduce JRA symptoms. Some recommended fruits and vegetables are carrots, celery, cabbage, potatoes, cherries, lemons, beets, cucumbers, radishes, and **garlic**. Tomatoes and other vegetables in the nightshade family (potatoes, eggplant, and red and green peppers) are discouraged. As an adjunct therapy, **aromatherapy** preparations include cypress, **fennel**, and lemon. Massage oils include **rosemary**, benzoin, **chamomile**, camphor, **juniper**, **eucalyptus**, and **lavender**. Other types of therapy that have been used are **acupuncture**, **acupressure**, and body work.

Also shown to be effective in some cases are the **essential fatty acids**: **omega-3 fatty acids** in **fish oil**, and the omega-6 fatty acid gamma liolenic acid (GLA) found in **borage oil**, current seed oil, and **evening primrose oil**. Several alternative medicine doctors suggest there may be some benefit in taking **cartilage supplements**, although no definitive studies had been done as of 2008 on this treatment. Anti-inflammatory spices such as **turmeric**, **ginger**, and **cayenne** may be helpful. Natural remedies such as **yucca**, **burdock root**, **horsetail**, **devil's claw**, sarsaparilla, and **white willow** bark also can be helpful since they have anti-inflammatory and analgesic properties.

Nutritional supplements that may be beneficial include large amounts of **antioxidants** (vitamins C, A, E, **zinc**, **selenium**, and flavonoids), as well as B vitamins and a full complement of minerals (including **boron**, **copper**, **manganese**). One study showed 1,800 International Units (IU) of **vitamin E** a day could be helpful in relieving symptoms. Other nutrients that assist in detoxifying the body, including **methionine**, cysteine, and other **amino acids**, may also be helpful. Constitutional **homeopathy** can also work to quiet the symptoms of JRA and bring about balance to the whole person.

Allopathic treatment

Treating JRA involves efforts to decrease the amount of inflammation, in order to preserve movement. Nonsteroidal anti-inflammatory agents (such as ibuprofen, naproxen, diclofenac, and celecoxib) are usually the first line of treatment for JRA to reduce inflammation. Analgesics, including acetaminophen and tramadol, may provide pain relief but do not reduce inflammation. Patients should ask their doctor about using analgesics in combination with their other arthritis medications. Steroid medications are effective but have many serious side effects with long-term use. Injections of steroids into an affected joint can be helpful. Steroid eye drops are used to treat eye inflammation. Drugs that act on the immune system may be added when NSAID monotherapy is not effective in treating symptoms. These include: methotrexate (Rheumatrex), azathioprine (Imuran), leflunomide (Arava), cyclosporine (Sandimmune), sulfasalazine (Azulfidine), and hydroxychloroquine (Plaquenil). Glucocorticoids are stronger medications that may be used in select cases of JRA in low doses for short-term treatment.

Tumor necrosis factor (TNF) antagonists represent a newer class of biologic drugs used to treat JRA. These drugs include etanercept (Enbrel); infliximab (Remicade), which is usually given with methotrexate; and adalimumab (Humira), a drug in this class approved by the U.S. Food and Drug Administration in February 2008. These drugs ease joint pain, reduce swelling, and improve mobility and may be associated with less severe side effects than other medications.

Physical therapy and exercises are often recommended in order to improve joint mobility and strengthen supporting muscles. Occasionally, splints are used to rest painful joints and to prevent or improve deformities.

Research has confirmed that the blood serum of patients with JRA contained elevated levels of interleukin-6, a cytokine (nonantibody protein) that is critical to regulation of the immune system and blood cell formation. Because interleukin-6 is also associated with inflammation, researchers have suggested that compounds inhibiting the formation of interleukin-6 may provide new treatment options for JRA.

Expected results

Treatment and continued physical activity can prevent loss of function, provide pain relief, and maintain joint mobility. Most children with JRA can attend

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KEY TERMS

Autoimmune disorder—A condition marked by an overactive immune system; the body's immune system mistakenly identifies the body's own tissue as foreign and attacks those tissues, as if trying to rid the body of an invader.

Rheumatoid factor—An antibody found in approximately 80% of patients with adult onset rheumatoid arthritis. When RF is identified in children with juvenile rheumatoid arthritis, there is an increased risk of joint damage, and the child may require more aggressive treatments.

Synovial membrane—A layer of connective tissue that lines the insides of joints, tendon sheaths, and bursae. The synovial membrane produces synovial fluid, which has a lubricating function.

Tumor necrosis factor (TNF) antagonist—A substance that blocks the action of TNF, a naturally occurring protein in the body that helps cause inflammation.

a regular school and benefit from being with children of the same age. Special school accommodations may be available for children with JRA under Federal Act 504 of the Rehabilitation Act of 1973, which bans discrimination against disabled persons in programs that receive federal funds.

The prognosis for pauciarticular JRA is quite good, as is the prognosis for spondyloarthropathy. Polyarticular JRA carries a slightly worse prognosis. RF-positive polyarticular JRA carries a difficult prognosis, often with progressive, destructive arthritis and joint deformities. Systemic onset JRA has a variable prognosis, depending on the organ systems affected, and the progression to polyarticular JRA. About 1 to 5% of all JRA patients die of such complications as infection, inflammation of the heart, or kidney disease.

Prevention

Little is known about the causes of JRA; therefore, there are no recommendations available for how to avoid developing it.

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ORGANIZATIONS

American College of Rheumatology, 1800 Century Place, Suite 250, Atlanta, GA, 30345, (404) 633-3777, http://www.rheumatology.org.

Arthritis Foundation, PO Box 7669, Atlanta, GA, 30357-0669, (800) 283-7800, http://www.arthritis.org.

National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS), National Institutes of Health, 1 AMS Circle, Bethesda, MD, 20892-3675, (877) 226-4267, (301) 495-4484, http://www.niams.nih.gov.

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K

Kali bichromium

Description

Kali bichromium is a bright orange, caustic, corrosive compound used in the manufacture of dye, photography, and batteries. It is also used as a homeopathic remedy. In **homeopathy**, **potassium** bichromate is diluted to the point where it no longer retains any poisonous or caustic qualities. Homeopaths usually abbreviate kali bichromium as kali bich. or as kali bi.

General use

Homeopathic medicine operates on the principle that "like heals like." This means that a disease can be cured by treating it with products that produce the same symptoms as the disease. These products follow another homeopathic law, the Law of Infinitesimals. In opposition to traditional medicine, the Law of Infinitesimals states that the lower a dose of curative, the more effective it is. To achieve a low dose, the curative is diluted many, many times until only a tiny amount, if any, remains in a huge amount of the diluting liquid.

In homeopathic medicine, kali bichromium is said to have an affinity for the mucous membranes and the skin. It is used primarily to treat stringy yellowish or greenish mucous discharges from any part of the body, including the nose, throat, larynx, vagina, urethra, and stomach. Its most common use is to treat colds that are accompanied by sinus congestion or evolve into sinusitis.

In these situations the patient feels pressure and fullness in the sinuses and experiences extreme **pain** at the root of the nose that improves when pressure is applied to the painful spot. Kali bichromium is also used to treat feelings of fullness and pressure in the middle ear and to treat sinus or migraine headaches that start at night.

In addition, kali bichromium is used to treat a sore throat with swollen tonsils, swollen neck, and a discharge of pus. In the mouth, ulcers or a dry, burning feeling are treated by kali bichromium when accompanied by intense pain at the root of the tongue or a dry, yellow-coated tongue.

Certain types of coughs are also treated with kali bichromium when the voice is rough and hoarse, and the **cough** is dry. If the cough worsens when breathing damp, cold air, worsens in the early hours of the morning, and is better in warm air, these are also indications to the homeopath that kali bichromium is an appropriate remedy.

Kali bichromium is used to treat joint pains that appear and disappear suddenly or wander to different spots in the body causing severe pain. These pains, like the cough, are improved by warmth.

Kali bichromium is sometimes used for relief of distress in the digestive system such as **nausea** and vomiting of yellow mucus and bile. In homeopathic terminology, the effectiveness of remedies is proved by experimentation and reporting done by famous homeopathic practitioners. Kali bichromium was proved as a **vomiting** remedy by Dr. John H. Clark (1853–1931).

In homeopathic medicine the fact that certain symptoms get better or worse under different conditions is used as a diagnostic tool to indicate what remedy will be most effective. Symptoms that benefit from treatment with kali bichromium get worse in the very early hours of the morning (2 a.m. to 5 a.m.), worsen in wet weather, are worse in the summer, are worse upon awaking, upon getting cold from undressing, and upon consuming alcohol (which often induces vomiting and **diarrhea** in patients that need this remedy). Symptoms improve with warmth, movement, pressure, and from eating. Patients needing kali bichromium tend to get cold easily.

Homeopathy also ascribes certain personality types to certain remedies. The kali bichromium personality is

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KEY TERMS

Sinusitis—An inflammation of the sinuses with or without a mucus discharge.

Urethera—The tube that drains the bladder.

said to be listless with aversion to physical or mental **exercise**. People with kali bichromium personalities also tend to be rigid and inflexible, doing most activities such as eating, sleeping, and working on a rigid timetable. They are very detail oriented. Morally, they tend to be very proper, rigid, and conservative, which results in a narrow-minded, self-centered personality.

Preparations

Kail bichromium is prepared by extensive dilutions of what is called a mother tincture of potassium dichromate dissolved in an alcohol/water mixture. There are two homeopathic dilution scales, the decimal (x) scale with a dilution of 1:10 and the centesimal (c) scale where the dilution factor is 1:100. Once the mixture is diluted, shaken, strained, then re-diluted many times to reach the desired degree of potency, the final mixture is added to lactose (a type of sugar) tablets or pellets. These are then stored away from light. Kali bichromium is available commercially in tablets or pellets in strengths of 6x, 12x, 30x, 200x, 6c, 12c, 30c, and 200c.

Homeopathic and orthodox medical practitioners agree that by the time the mother tincture is diluted to strengths used in homeopathic healing, it is likely that very few if any molecules of the original remedy remain. Homeopaths, however, believe that these remedies continue to work through an effect called potentization that has not yet been explained by mainstream scientists.

Precautions

No particular precautions have been reported when using kali bichromium.

Side effects

When taken in the recommended dilute form, no side effects have been reported. However, concentrated quantities of this compound are corrosive.

Interactions

Studies on interactions between kali bichromium given in homeopathic doses and conventional pharmaceuticals are nonexistent.

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ORGANIZATIONS

Foundation for Homeopathic Education and Research. 21 Kittredge Street, Berkeley, CA 94704. (510) 649–8930.

International Foundation for Homeopathy. P. O. Box 7, Edmonds, WA 98020. (206) 776–4147.

National Center for Homeopathy. 801 N. Fairfax Street, Suite 306, Alexandria, VA 22314. (703) 548–7790.

ORGANIZATIONS

The British Institute of Homeopathy Canada. 1445 St. Joseph Blvd., Gloucester, ON K1C 7K9 Canada. (613) 830–4759. http://www.homeopathy.com.

OTHER

Holistic Medicine Online. http://www.holisticmed.com.

Tish Davidson

Kampo medicine

Definition

Kampo (sometimes spelled kanpo) is a Japanese variant of Chinese traditional medicine that involves the extensive use of herbs. The name is derived from the Japanese symbols *kan*, which means China and *po*, which means medicine. Kampo treatment has become very much integrated in the Japanese health care system. It is widely available from hospitals and physicians there, and is the most popular form of complementary health care in contemporary Japan. Kampo herbal preparations are sold by many pharmacies in Japan, which, according to the World Health Organization (WHO), has the highest per capita consumption of herbal medicine in the world. In addition to herbal treatments, Kampo practitioners may also administer **acupuncture**, **moxibustion** (therapy using moxa, or **mugwort** herb), and manipulative therapy.

Origins

Oriental traditional medicine has employed herbs for almost 4,000 years. Much of the earliest literature about the subject comes from ancient China, where wealthy families hired herbalists and paid them only

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when everyone in the family enjoyed good health. Kampo medicine is a form of **traditional Chinese herbalism**, which came to Japan about 16 centuries ago and was refined over the years by Japanese practitioners. At Shoso-in, a famous historical site in western Japan, a 1,200-year-old cache of medicinal herbs was discovered—stored in air-tight wooden boxes. Researchers found that many of those samples still retained full medicinal potency.

Western medicine started to enter Japan with Jesuit missionaries and Dutch traders during the 16th and 17th centuries, but never succeeded in fully displacing traditional practices. In recent years, a considerable resurgence of Kampo's popularity has occurred.

Benefits

Kampo preparations are used to treat a wide variety of conditions, including **eczema**, atopic **dermatitis**, and gynecological problems. Other applications include **allergies**, **rheumatoid arthritis**, chronic **hepatitis**, diabetic **retinopathy**, bronchial **asthma**, endometrial **cancer**, collagen disease, colds, **nausea**, high **cholesterol**, and even **bedwetting**.

Description

Like other forms of Oriental traditional medicine, Kampo is based on concepts quite foreign to Western medical thinking. These concepts include *In-You* (negative and positive); *Gogyou* (five lines); *Ki* (air); *Sui* (water); and *Ketu* (blood). Unlike Western medicine, which thinks largely in terms of diseases affecting specific organs, Kampo emphasizes identifying patterns of "whole body" symptoms.

Kampo herbal treatments are divided into three basic groups related to urination, to sweating, and to defecation. Most prescriptions consist of a combination of crude drugs, used to treat whatever disharmony is detected. Kampo remedies usually take longer to work than standard pharmaceuticals. A typical trial period for a new prescription is three months. Patients may continue taking some prescriptions for years. Examples of crude drugs used in Kampo preparations include glycyrrhiza (**licorice**), rhubarb, and ginseng.

Japan's medical regulators have recognized Kampo since the 1970s, and Kampo herbs are included in the list of reimbursable drugs under the country's national health insurance plan. During the 1990s and continuing into the new millennium, Japanese officials required recertification of a number of Kampo drugs, insisting that their safety and effectiveness be re-evaluated.

Japanese pharmacists are allowed to manufacture a limited number of drugs themselves. Of these licensed products, 50 percent are Kampo products, according to the Japan Pharmaceutical Association.

Precautions

As with all Oriental herbal remedies, persons should use only Kampo preparations obtained from a reliable source. Serious problems have arisen when Oriental herbal prescriptions were misidentified or contained adulterants. The Register of Chinese Herbal Medicine in the United Kingdom recommends that patent medicines mixing Western and Oriental herbs be avoided, together with any patent preparation containing heavy metals. Some patients have developed hepatitis after taking patent-medicine tablets based on traditional Oriental formulas. One investigation revealed that the tablets did not contain the complete herb, but rather a chemical isolated from a single herb. This practice contradicts the most basic principles of Oriental traditional medicine, which uses combinations of whole herbs.

Because of Kampo's complexity, self-treatment is usually not advised, and consultation with a knowledgeable practitioner is essential. Some patients have experienced serious, even fatal, kidney or liver problems after treatment with Oriental herbs. Anyone with a history of disease in those organs should not be treated without accompanying blood tests to monitor their function. It has also been suggested that patients who consume considerable amounts of alcohol should receive liver function tests. It is important that patients be monitored after starting Oriental herb treatments to check for signs of liver or kidney problems.

Side effects

Because Kampo and other forms of Oriental traditional medicine are so old, practitioners say that most side effects were identified long ago and so are easily avoided by an experienced practitioner. Some Oriental herbal preparations, however, are known toxins that continue to be prescribed because of their beneficial effects. These must be used with extreme care, employing only low doses under the direction of a highly competent and certified practitioner. In most cases, these preparations should be used only in a hospital setting. In addition, some people may have an allergic hypersensitivity to certain herbs.

Research and general acceptance

In Japan, Kampo treatment is studied and frequently prescribed by medical doctors. As many as 70

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percent of Japanese gynecologists are said to employ Kampo, particularly in menopausal patients.

Training and certification

In Japan, Kampo drugs are widely available from medical doctors and pharmacists. In the rest of the world, Kampo preparations and practitioners are largely unregulated.

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Kaposi's sarcoma

Definition

Kaposi's sarcoma (KS), also called multiple idiopathic hemorrhagic sarcoma, is a neoplastic disease associated especially with **AIDS**, usually affecting the skin and mucous membranes.

Description

Typically, raised lesions appear on the skin and in the mouth. These are quite disfiguring nodules or blotches and can be red or purple. The gastrointentinal track and the respiratory track can be involved with symptoms of coughing, **fever**, and inflammation and swelling.

Causes and symptoms

Kaposi's sarcoma (KS) is caused by human herpesvirus 8 (HHV8). Malignant cells are found in the tissues under the skin or mucous membranes that line the mouth, nose, and anus. KS causes red or purple patches on the skin and/or mucous membranes and spread to other organs, such as the lungs, liver, or intestinal tract. KS is seen in three forms:

- indolent
- lymphadenopathic
- AIDS related

The primary distinction between the three forms of KS is the rate of growth and the location of the lesions. In the past, the indolent form of Kaposi's sarcoma was the most common and was most often seen in men, over the age of 60 years, of Jewish or Italian ancestry, in African men, and in patients who had organ transplants or have had their immune systems impaired for other reasons. KS was frequently left untreated. Because of its slow growth, the **cancer** was not a threat to the patient. Since the 1980s, more cases with rapid growth have been observed, usually accompanied by AIDS (HIV disease).

The aggressive form of KS is seen in about one-third of patients with AIDS, and has become endemic in equatorial African. In African nations, aggressive KS is seen most often among young men and children.

Lymphadenophic KS affects the lymph nodes, as well as the skin structures.

Diagnosis

KS is traditionally diagnosed based on the red or purple patches on the skin or mucous membranes. A biopsy is usually performed in order to verify the diagnosis. Since other cancers may have a similar appearance to KS, it is often useful to test for the presence of human herpesvirus 8 in order to confirm the diagnosis.

Treatment

In indolent KS, localized treatment is often adequate. Superficial lesions may be removed surgically. Alternatives are radiation therapy, electrical curettage, in which the lesion is burned with an electrical current, or cryotherapy, in which a source of extreme cold, such as liquid nitrogen, is applied to the cancer in order to kill the cells.

Among patients who develop KS after an organ transplant, reduction in the dose of drugs used to control the immune response may be enough to control or

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eliminate the cancer, although this procedure increases the risk of transplant rejection. One report from the University of Barcelona in Spain stated that a change of medication may resolve the problem of KS after transplantation.

In KS associated with AIDS, systemic chemotherapy is usually required.

The Gay Men's Health Crises (GMHC) has reviewed a number of alternative therapies that have been tried in KS, but none has shown consistently favorable results. Among the treatments mentioned were shark cartilage, herbal and purifying massage therapies to enhance immune function, and transcendental **meditation**. **Homeopathy** has been tried, but here too the results have not been reliable.

Allopathic treatment

KS cannot be cured in the usual sense of the term. However, treatments are available to deal with weakened immune systems that make possible the disease. Among individuals with HIV and AIDS diseases, drug "cocktails" to combat the human immunodeficiency virus (HIV) have produced improvement in KS symptoms in nearly half of all cases. Cryosurgery and radiation are sometimes used to remove the lesions associated with KS, but traditional surgery is generally not recommended because of dangerous side-effects.

Expected results

Expected results depend primarily on the underlying condition of the patient. Those patients who have classic, slow-growing KS may live many years, even in the absence of treatment. For patients with HIV/AIDS, a proposed staging system has divided patients into low and high risk groups, depending both on the extent of the sarcoma and their underlying immune function. Patients with well functioning immune systems, no AIDS associated opportunistic **infections**, and KS confined to the skin, have an estimated survival of about three years. Those with impaired immune systems, other infections, and more widespread KS, have an estimated survival of about one year. Overall survival depends on the patient's response to treatment.

A variety of other drugs is available for treating various aspects of KS. The antiviral drug vinblastine and **sodium** tetradecyl sulfate are sometimes injected directly into the lesions associated with KS. Systemic treatment for the disease is possible using the anti-cancer drugs doxorubicin and daunorubicin. Encouraging results with use of the anti-cancer drug paclitaxel (Taxol) and the anti-leukemia drug imatinib have also been reported.

KEY TERMS

Acquired immune deficiency syndrome (AIDS)—a disease in which the immune response is impaired. The disease is caused by the human immunodeficiency virus (HIV), which is spread by direct contact with body fluids such as blood and semen.

Lesion—A diseased patch of skin.

Sarcoma—A cancer arising from connective tissue such as skin.

Prevention

The United States Public Health Service (USPHS) guidelines for prevention of KS call for prophylactic administration of drugs that are effective against human herpesvirus-8. The primary drugs for this purpose are foscarnet and ganciclovir. In each case, the dose must be adjusted based on the patient's condition. While the USPHS recognizes that KS may affect children as well as adults, no formal recommendations for prevention had been published as of 2008.

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Kava kava

Description

Kava kava (*Piper methysticum*) is a tropical shrub that grows throughout the Pacific Islands. Kava kava belongs to the pepper family (Piperaceae) and is also known as kava, asava pepper, or intoxicating pepper. It grows to an average height of 6 ft (1.83 m) and has large heart-shaped leaves that can grow to 10 in (25.4 cm) wide. A related species is *Piper sanctum*, a native plant of Mexico that is used as a stimulant.

Kava kava has been used as a medicinal herb for hundreds of years and used by Pacific Islanders to treat rheumatism, **asthma**, **worms**, **obesity**, headaches, **fungal infections**, leprosy, gonorrhea, vaginal **infections**, urinary infections, menstrual problems, migraine headaches, and **insomnia**. It was also used as a diuretic, an aphrodisiac, to promote energy, and to bring about sweating during colds and fevers. Pacific Islanders consume a kava kava drink at social, ritual, and ceremonial functions. It is drunk at ceremonies to commemorate marriages, births, and deaths; in meetings of village elders; as an offering to the gods; to cure illness; and to welcome honored guests. Pope John Paul II, Queen Elizabeth II, and Hillary Rodham Clinton have all drunk kava kava during their island visits.

The drink is prepared by grinding, grating, or pounding the roots of the plant, then soaking the pulp in cold water or coconut milk. Traditionally the root was chewed, spit into a bowl, and mixed with coconut milk or water. That practice is no longer the standard.

Captain James Cook has been accredited with the western discovery of kava kava during his journey to the South Pacific in the late 1700s. The first herbal products made from kava kava appeared in Europe in the 1860s. Pharmaceutical preparations became available in Germany in the 1920s. Currently, kava kava has received widespread attention because of its reputation to promote **relaxation** and reduce stress.

General use

Kava kava has been prescribed by healthcare providers to treat a wide range of ailments including

The root of the kava kava plant can be pressed into a muddy and bitter drink with relaxing benefits. The beverage is making a comeback in Hawaii amid a broader cultural renaissance in Hawaiian language, music and arts. *(Lucy Pemoni / AP Photo)*

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Kava, leaves with inflorescences. *(© inga spence / Alamy)*

insomnia, nervousness, and stress-related **anxiety** and anxiety disorders. It is also reported to relieve urinary infections, **vaginitis**, fatigue, asthma, rheumatism, and **pain**.

The active ingredients in kava kava are called kavalactones and are found in the root of the plant. Kavalactones cause reactions in the brain similar to pharmaceutical drugs prescribed for depression and anxiety. Research has shown that kavalactones have a calming, sedative effect that relaxes muscles, relieves spasms, and prevents convulsions. Kavalactones also have analgesic (pain-relieving) properties that may bring relief to sore throats, sore gums, canker sores, and toothaches.

Kava kava is a strong diuretic that is reportedly beneficial in the treatment of **gout**, rheumatism, and arthritis. The effect of the herb relieves pain and helps remove waste products from the afflicted joints. Antispasmodic properties have shown to help ease menstrual cramps by relaxing the muscles of the uterus. Kava kava's antiseptic and anti-inflammatory agents may help relieve an irritable bladder, urinary tract infections, and inflammation of the prostate gland.

Preparations

Kava kava is available in dry bulk (powdered or crushed), capsule, tablet, tea, and tincture forms. Many of the products are made from the dried powder of the root. Western consumers have generally been advised to look for standardized extracts of kava kava that contain a 70% kavalactone content. On the other hand, a report submitted to the Committee of Safety of Medicines (CSM) of the United Kingdom in April 2002 indicates that many of the side effects reported in connection with kava kava are due to the high concentration of the herb in commercial standardized extracts. The report suggested that kava preparations made according to traditional methods are relatively safe. It is likely that controversy over kava kava will continue.

Precautions

Before 2002, the usual precautions regarding kava kava stated that it should not be used by pregnant or lactating women, or when driving or operating heavy machinery. The American Herbal Products Association (AHPA) advised consumers in 1997 not to take kava kava for more than three months at a time, and not to exceed the recommended dosages. In light of more recent findings, however, it would be prudent for many adults to completely avoid preparations of or products containing kava kava.

As of March 25, 2002, the United States Food and Drug Administration (FDA) recommended that people who have a history of liver disease or are taking medications that affect the liver should consult a physician before taking any preparations containing kava kava.

Side effects

Prior to 2002, most reports of side effects from kava kava concerned relatively minor problems, such as numbness in the mouth, headaches, mild **dizziness**, or skin **rashes**. Nineteenth-century missionaries to the Pacific islands noted that people who drank large quantities of kava kava developed yellowish scaly skin. A more recent study found the same side effect in test subjects who took 100 times the recommended dose of the plant.

As of 2002, however, kava kava has been associated with serious side effects involving damage to the liver, including **hepatitis**, **cirrhosis**, and liver failure. Most of the research on kava kava has been done in Europe, where the herb is even more popular than it is in the United States. By the late fall of 2001, there had been at least 25 reports from different European countries concerning liver damage caused by the plant. French health agencies reported one death and four patients requiring liver transplants in connection with kava kava consumption. On December 19, 2001, the MedWatch advisory of the U. S. Food and Drug Administration posted health warnings about the side effects of kava kava; and on January 16, 2002, Health Canada advised Canadians to avoid all products containing the herb. France banned the sale of preparations containing kava kava in February 2002. The U. S. National Center for Complementary and

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Kava kava plant. *(Gilbert S. Grant / Photo Researchers, Inc.)*

Alternative Medicine (NCCAM) put two research studies of kava kava on hold while awaiting further action by the FDA. NCCAM advised consumers in the United States on January 7, 2002 to avoid products containing kava. On March 25, 2002, the FDA issued a consumer advisory and a letter to health care professionals concerning the risk of severe liver damage from the use of products containing kava kava. While the most recent actions on the part of the FDA stop short of banning kava products from the U. S. market, the agency asks consumers as well as medical practitioners to notify its MedWatch hotline of any liver damage or other injuries associated with using kava kava. The MedWatch toll-free number is (800) 332-1088.

In addition to causing liver damage, kava kava appears to produce psychological side effects in some patients. Beverages containing kava kava have been reported to cause anxiety, **depression**, and insomnia. In addition, kava kava has caused tremors severe enough to be mistaken for symptoms of **Parkinson's disease** in susceptible patients.

Interactions

Kava kava has been shown to interact with beverage alcohol and with several categories of prescription medications. It increases the effect of barbiturates and other psychoactive medications; in one case study, a patient who took kava kava together with alprazolam went into a coma. It may produce dizziness and other unpleasant side effects if taken together with phenothiazines (medications used to treat **schizophrenia**). Kava kava has also been reported to reduce the effectiveness of levodopa, a drug used in the treatment of Parkinson's disease.

Some interactions between kava kava and prescription medications, as well as some of the herb's side effects, have been attributed to synergy (combined effects) among the various chemicals contained in kava kava rather than to any one component by itself.

KEY TERMS

Analgesic—A medication or preparation given for pain relief.

Barbiturate—A group of drugs that have sedative properties. Barbiturates depress the body's respiratory rate, blood pressure, temperature, and central nervous system.

Diuretic—A substance that increases the flow of urine. Diuretics are given to lower the volume of liquid in the body.

Kavalactones—Medically active compounds in kava root that act as local anesthetics in the mouth and as minor tranquilizers

Sedative—A drug that has a calming and relaxing effect. Sedatives are used to aid sleep and ease pain, and are often given as mild tranquilizers.

Standardized extract—A product that contains a specific amount of the active ingredients of the herb.

Synergy—Combined action or effects. Some researchers think that the side effects and interactions reported for kava kava are related to synergy among the various compounds in the herb.

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Kegel exercises

Definition

Kegel exercises (Kegels) are exercises designed to strengthen the muscles of the lower pelvic girdle, or pelvic floor—the pubococcygeal (PC) muscles. The PC muscles support the bladder, urethra, and urethral sphincter—the muscle group at the neck of the bladder that acts as a spigot for controlling urine flow into the urethra— and the vagina, uterus, and rectum. Anything that puts pressure on the abdomen can weaken or damage these pelvic muscles. Such conditions include **pregnancy**, **childbirth**, excess weight, hormonal changes, and **aging**. Kegel exercises enable the PC muscles to better withstand increases in intra-abdominal pressure (pressure inside the abdomen). They make the bladder, urethra, and vagina more resilient, and improve bladder control and sexual relations.

Thirteen to 20 million American women suffer from **urinary incontinence**, primarily stress urinary incontinence (SUI)—urine leakage while laughing, coughing, **sneezing**, standing up suddenly, or exercising. SUI occurs when intra-abdominal pressure increases and the urethral sphincter opens inappropriately. During pregnancy, the fetus puts pressure on the bladder and the sphincter may relax and leak. Postpartum incontinence may result from muscle and nerve damage during childbirth due to delivery of a large baby, prolonged labor, excessive pushing, a forceps delivery, or an episiotomy (an incision made during delivery to prevent tearing of maternal tissue). About 40% of American women suffer from incontinence after childbirth, and the incidence increases by about 12% following each birth. Childbirth also increases the risk for incontinence later in life. During **menopause**, as a result of lower levels of estrogen, women with SUI may have thinning of the lining of the outer urethra, a sensation of having to urinate often, and recurrent urinary tract **infections** (UTIs). Beginning Kegels in midlife can help prevent urinary incontinence later.

Origins

In the 1930s, Dr. Joshua W. Davies hypothesized that strengthening the PC muscles could improve bladder control by assisting the closure of the urethral sphincter. By 1948, Dr. Arnold M. Kegel, a Los Angeles-area obstetrician and gynecologist, was having his patients practice vaginal contractions in preparation for childbirth. That same year he invented the Kegel perineometer, or pelvic-muscle sensor, to help prevent urinary incontinence (leakage) following childbirth.

Kegel's perineometer was the first **biofeedback** machine designed for clinical use. Employing a vaginal

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sensor, an air-pressure balloon, and a tire gauge, it enabled patients to verify that they were performing Kegel's correctly and to monitor their progress. The patients continued their practice at home. Kegel published numerous papers on his work and claimed to have cured incontinence in 93% of 3,000 patients. He produced a documentary movie to teach the procedure to other physicians. However, his perineometer was never marketed effectively and there was a widespread misconception that Kegels could not be performed without it. In the 1970s, more sensitive electromyography (EMG) perineometers became available for those with severely debilitated pelvic muscles.

KEY TERMS

Biofeedback—An electronic monitoring technique for learning to control a body movement or function.

Electromyography (EMG)—The recording of electrical currents generated by muscle activity.

Incontinence—Inability to control the passage of urine or feces.

Perineometer—A device for measuring PC-muscle contraction.

Pubococcygeal (PC) muscles—The muscles of the lower pelvic girdle, or pelvic floor, which support the bladder, urethra, and urethral sphincter; the muscle group at the neck of the bladder that acts as a spigot for controlling urine flow into the urethra, vagina, uterus, and rectum.

Stress urinary incontinence (SUI).—Urine leakage upon straining, coughing, laughing, or sneezing.

Urethra—The tube that delivers urine from the bladder to the exterior.

Urethral sphincter—Circular muscle that controls the movement of urine from the bladder to the urethra.

Vaginal cone—A weighted cone held in the vagina for Kegel excercising.

Vulvar vestibulitis—Inflammation of the vestibule of the vulva or vagina.

Benefits

Kegel exercises strengthen the PC muscles and increase blood flow and nerve supply to the pelvic region, promoting or resulting in:

- increased pelvic support
- restoration of vaginal muscle tone and improved vaginal health
- protection from the physical stresses of childbirth
- restoration of sexual function and improved sexual response and pleasure
- increased vaginal-wall thickness and lubrication after menopause (cessation of menstruation)
- prevention or reversal of urinary leakage and rectal incontinence
- relief from pelvic pain or pain of vulvar vestibulitis (inflammation of the vaginal opening)

Description

Locating the PC muscles

The PC muscles can be felt by:

- stopping and starting urine flow to identify the forward PCs
- squeezing the vagina to identify the back of the PCs
- squeezing around two fingers placed in the vagina
- imagining sucking a marble up the vagina
- preventing a bowel movement or the passing of gas by tightening the muscles around the anus

There is a pulling sensation when the correct muscles are contracted. Weaker and stronger contractions are practiced until the PC muscles can be squeezed at will.

Practicing Kegels

There are numerous suggestions for practicing Kegels, which include:

- Contracting the PC muscles three to 10 seconds and relaxing them three to 10 seconds for five to 15 repetitions, three to 12 times per day.
- Contracting the PC muscles strongly for one second then releasing for one second, 20 times, three times per day, speeding up the contractions until there is a fluttery sensation.
- While emptying the bladder, stopping the urine flow at least three seconds, 10 times during each urination, which provides 60–80 contractions per day. The complete **exercise** requires muscle contraction from back to front. It may take three to eight weeks for noticeable improvement. Once good muscle tone is achieved, Kegels may be performed just once a day.

The PC muscles can be exercised at almost any time—while lying down, sitting (in the car at a stop light, at work, etc.), squatting, standing, or walking—and varying the exercise position is said to be most effective. Sitting or standing adds weight to the exercise. It may be helpful to perform a Kegel squeeze before

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coughing, standing up, or lifting a heavy object. It may also be helpful to incorporate Kegels into a daily routine and keep a log. It is recommended that pregnant women practice Kegels regularly before, as well as after, childbirth.

Squeezing with two fingers in the vagina will confirm that only the vaginal muscles are contracting. Placing a hand on the lower abdomen is a reminder to keep the belly soft and relaxed, to refrain from tightening other muscles such as the stomach, buttocks, or leg muscles, or to hold the breath, all of which increase intra-abdominal pressure, working against the Kegels.

Vaginal cones

Kegels can be performed by the ancient Chinese technique of placing a weighted cone in the vagina and holding it in place up to 15 minutes twice a day. The practice is initiated using the heaviest cone that can be held easily for one minute. The cones weigh from 15–100 gm (0.04–0.3 lb). Brands include FemTone Weights, Kegel Weights, Kegel Kones, and Perineal Exerciser. Sequentially heavier cones are used until a maintenance program is established. This method automatically uses the correct muscles. Some of these products require a doctor's prescription.

Biofeedback devices and electrical stimulation

Nerve damage may prevent some people from performing Kegels properly. Vaginal or anal sensors and EMG perineometers with computerized visual or auditory feedback displays can measure the PC contraction. A handheld over-the-counter product (called the Myself pelvic muscle trainer) costs about $90. Another device can send mild electrical impulses to help locate the PC muscles.

With a vaginal sensor and biofeedback monitor, two 20-minute sessions per day for seven to nine months—with a specific goal such as holding 45-microvolts for 60 seconds—can relieve vulvar vestibular **pain** in the majority of women.

Insurance may not pay for EMG biofeedback therapy; however Medicare will reimburse for it if conventional Kegel exercises have failed.

Preparations

Training may be provided before initiating a Kegels routine.

Precautions

A temporary loss of muscle and nerve function following childbirth may make Kegels more difficult.

Kegel exercises do not work if abdominal, thigh, or buttock muscles are contracted. Furthermore, such contractions can increase pressure on the bladder, aggravating incontinence. Vaginal cones are not recommended in the presence of infection, neurological damage, diuretic medicines, or **caffeine**.

Side effects

There are no side effects to Kegel exercises.

Research and general acceptance

When performed properly and consistently, Kegels are usually helpful. The United States Agency for Health Care Policy and Research recommends that behavioral methods, including Kegels and biofeedback, be utilized to treat urinary incontinence before initiating drugs or surgery. Randomized controlled studies have shown that as many as 50–90% of women can reduce or overcome SUI with Kegels alone. However, reports of effectiveness vary since many people do not receive proper Kegel instruction. Consistent use of vaginal cones can improve or cure incontinence within four to six weeks in 70% of women.

The use of Kegels to improve urinary incontinence in men has not been extensively studied, although many clinicians report improvement. One study found that after the removal of a cancerous prostate, men who performed Kegels twice a day regained bladder control faster than those who did not do the exercises.

Training and certification

Patient training in Kegel exercises can be performed by a knowledgeable healthcare provider.

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Continence Restored, Inc. 407 Strawberry Hill Avenue, Stanford, CT 06902. (914) 493-1470.

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Margaret Alic

Kelley-Gonzalez diet

Definition

The Kelley-Gonzalez diet consists of large amounts of raw fruits, juices, raw and steamed vegetables, cereals, and nuts. When combined with massive quantities of dietary supplements and freeze-dried pancreatic enzymes, together with a "detoxification" process involving coffee enemas, it is said to slow the growth of **cancer** tumors.

Origins

The Kelley-Gonzalez regimen is based on a belief that enzymes from the pancreas are capable, like chemotherapy, of killing cancer cells. The use of pancreatic enzymes to treat cancer was first proposed in 1906 by John Beard, a Scottish embryologist. This idea received some attention at the time but was largely abandoned after Beard died in 1923. During the 1960s, the concept was resurrected by William Donald Kelley, a controversial dentist from Grapevine, Texas. Kelley wrote a book titled *One Answer to Cancer* that outlined his five-pronged approach:

- Nutritional therapy: Beef pancreatic enzymes combined with numerous other dietary supplements.
- Diet: A carefully individualized diet, ranging all the way from vegetarian to all-meat.
- Detoxification: As few as three or as many as 52 weeks of enemas and laxative purging.
- Neurological stimulation: Various manipulations including chiropractic, osteopathic, mandibular, and physiotherapeutic.
- Spiritual therapy: Prayer and Bible reading.

In 1981, Nicholas Gonzalez, then a second-year medical student at Cornell University, began a five-year investigation of Kelley's work. Reviewing 10,000 patient records and interviewing 500 cancer patients, Gonzalez became convinced that many of Kelley's patients had survived significantly longer than would otherwise have been expected. "Despite the careful documentation and the five-year investment of time, my attempts at publication were met with scorn and ridicule," Gonzalez recalls. "It seemed no one in academic medicine could, at the time, accept that a nutritional therapy might produce positive results with advanced cancer patients."

In 1987, Gonzalez started practicing medicine in New York City and developing his own cancer regimen similar to Kelley's, except that he rejected the neurological and spiritual aspects of Kelley's treatment. In 1999, the journal *Nutrition and Cancer* published results from a pilot study of the Gonzalez regimen in 11 patients with inoperable, advanced pancreatic cancer. the results were promising enough to prompt the U.S. National Institutes of Health's (NIH) National Center for Complementary and Alternative Medicine (NCCAM) to sponsor a $1.4 million, seven-year, large-scale clinical study of the regimen. In the study, one group of patients received the standard chemotherapy,

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KEY TERMS

Amebiasis—An infection or disease caused by amoebas.

Campylobacter—A bacterium that can invade the lining of the intestine.

Hyponatremia—Abnormally low levels of sodium in the blood, often related to dehydration.

Sepsis—The presence of pus-forming micro-organisms or their toxins in the blood.

and the other group followed the Kelley-Gonzalez regimen. The study accepted participants until 2005. The results have not yet been released.

Benefits

In his New York medical practice, Gonzalez uses his enzyme-based treatment on patients with pancreatic cancer, as well as a wide variety of other cancers. In addition, he uses variations of the Gonzalez regimen to treat a range of other illnesses, including **chronic fatigue syndrome**, arthritis, and **multiple sclerosis**.

Description

As currently practiced by Gonzalez, the regimen includes pancreatic enzymes taken orally every four hours and at meals for 16 days. Patients also take as many as 150 dietary supplements a day, including vitamins, minerals, **magnesium** citrate, papaya, trace elements, and glandular products from animals. Patients also receive frequent coffee enemas. They are placed on a strict diet including large quantities of fresh fruits, vegetable juices, cereals, and as many as 20 almonds a day. Red meat, white sugar, chicken, refined grain products, and soy are all forbidden. Fish is allowed only in limited quantities.

Precautions

The Kelley-Gonzalez diet is considered a highly experimental treatment for cancer, with only limited evidence of its effectiveness. It should therefore be undertaken only with competent medical advice and monitoring. Prospective patients should be aware that the diet requires considerable commitment and can almost be considered a full-time job. Initially, it can involve as many as eight enemas a day as well as preparing four servings of fresh carrot juice and taking dietary supplements 10 times a day.

Side effects

At least two deaths have been linked to coffee enemas, attributed to hyponatremia (**sodium** deficiency in the blood) and dehydration. With unqualified practitioners, a risk of contamination may result from unsanitary equipment used to administer enemas. For example, one outbreak of *Campylobacter* sepsis occurred among clients of a border clinic in Mexico that offered coffee enemas. In Colorado, an amebiasis outbreak was linked to fecal contamination of an enema-delivery system. Other side effects of the Kelley-Gonzalez treatment may include low-grade **fever**, muscle aches and pains, or **rashes**.

Research and general acceptance

For many years, the Kelley-Gonzalez Diet was rejected by orthodox medical practitioners. However, as described earlier, a 1999 pilot study by Gonzales has led to a clinical trial sponsored by the NIH. The results of that large-scale trial are not yet available.

Training and certification

Gonzalez offers his regimen from his medical practice in New York City. In a 1995 interview with *The Moneychanger*, he said that there are other practitioners "who say they do the Kelley therapy or the Gonzalez therapy, and I've never even met them."

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Kelp

Description

Kelp (*Fucus vesiculosus*) is a type of brown seaweed, moderate in size, that grows in regions with cold coastlines including those of the northwestern United States and northern Europe. There are several varieties of kelp: true kelp, which thrives in cool seas; giant kelp and bladder kelp, which grow in the North Pacific. Giant kelp is so named because it grows to 213 ft (65 m). Kelp anchors itself to rocky surfaces via tentacle-like roots. From these roots grows a slender stalk with long, leaf-like blades.

Kelp belongs to the Laminaria family. Other names for *Fucus vesiculosus* are kelpware, black-tang, bladderfucus, cutweed, and **bladderwrack**. The main constituents of kelp include phenolic compounds, mucopolysaccharides, algin, polar lipids, and glycosyl ester diglycerides. Kelp also contains protein, carbohydrates, and **essential fatty acids**.

Kelp contains approximately 30 minerals. It is a rich source of **iodine**, **calcium**, **sulfur**, and silicon. Other minerals include **phosphorus**, **iron**, **sodium**, **potassium**, **magnesium**, chloride, **copper**, **zinc**, **manganese**, barium, **boron**, **chromium**, lithium, nickel, silver, titanium, **vanadium**, aluminum, strontium, bismuth, chlorine, cobalt, gallium, tin, and zirconium. Kelp also contains vitamins C, E, D, K, and B complex. The highest concentrations of these vitamins and minerals are found in the tissues of kelp. Since kelp is such a valuable source of nutrients, it is often recommended as a dietary supplement, particularly for people with mineral deficiencies.

Origins

Different kinds of kelp have been eaten for nutritional value for over a thousand years. The Chinese used kelp and other types of seaweed as medicine as far back as 3,000 B.C. The Greeks used kelp to feed their cattle around the first century B.C. Kelp has been a staple food of Icelanders for centuries, and ancient Hawaiian nobles grew gardens of edible seaweed.

Kelp forest. West Coast, USA. *(© Papilio / Alamy)*

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KEY TERMS

Diuretic—A substance that promotes urination.

Goiter—An enlargement of the thyroid gland.

Hypothyroidism—A condition resulting from an underactive thyroid gland.

Infusion—An herbal tea created by steeping herbs in hot water. Generally, leaves and flowers are used in infusions.

Kelp was also used in Europe and Great Britain as fertilizer to nourish soil and assist plant growth.

The largest consumer of kelp, however, has been Japan. The Japanese have incorporated kelp and seaweed into their **diets** for 1,500 years. During the seventh to ninth centuries, only the Japanese nobility consumed seaweed. In the seventeenth century, Japan began farming seaweed. The Japanese and other Asian cultures used kelp to treat uterine problems, genital tract disorders, and kidney, bladder, and prostate ailments.

Kelp is still an integral part of the Japanese diet. The Japanese include kelp in almost every meal, using it in salads or as a garnish, or cooking it in soups, sauces, and cakes. Noodles made from kelp are a staple of the Japanese diet. Until recently, kelp was eaten almost exclusively by the Japanese. Now the Western population is beginning to take note of this nutrient-rich seaweed. However, *Fucus vesiculosus* is not the kind of kelp that is eaten.

Eating dietary kelp may be responsible for the low rate of **breast cancer** among Japanese women, and also for the low rate of **heart disease**, respiratory disease, rheumatism, arthritis, high blood pressure, and gastrointestinal ailments. The occurrence of thyroid disease is also low in Japan.

General use

Many herbalist and naturopathic physicians recommend *Fucus vesiculosus* to treat thyroid disorders, arthritis, rheumatism, **constipation**, colds, high blood pressure, **colitis**, **eczema**, goiter, **obesity**, low vitality, poor digestion, nervous disorders, menstrual irregularities, glandular disorders, and water retention.

Fucus vesiculosus has a therapeutic effect on many systems of the body. It strengthens immune system function and increases resistance to infection and **fever**. Kelp is also beneficial to the nervous and endocrine systems. It enhances the function of the adrenal, thyroid, and pituitary glands, and supports brain health and function.

One of the main therapeutic uses of *Fucus vesiculosus* is for thyroid conditions such as **hypothyroidism** and goiter. Partly due to its high iodine content, this kind of kelp assists in the production of thyroid hormones, which help regulate the thyroid gland. People who don't eat dairy products, seafood, and salt may develop an iodine deficiency. This may result in low thyroid function. Kelp is a good source of iodine for those who may be deficient.

Thyroid hormones are also necessary to maintain a normal metabolism. *Fucus vesiculosus* helps boost metabolism, which helps to sustain normal weight (especially in people who are overweight because of a thyroid condition).

This type of kelp is also used to rid the body of and keep it from absorbing harmful chemicals, toxins, carcinogens, and such heavy metal pollutants as barium and cadmium. Algin, a fiber-like extract of kelp, helps prevent the body from assimilating these elements. Algin is used industrially in the production of tires and as an agent that prevents ice cream from crystallizing. Kelp also helps to prevent the body from absorbing radioactive elements such as strontium 90, a dangerous radioactive substance created by nuclear power plants. However, since *Fucus vesiculosus* absorbs toxic chemicals, it must be harvested from clean waters or it may contain toxins.

Kelp also reduces **cholesterol** levels by inhibiting bile acid absorption. The diuretic effect of kelp is beneficial to an irritated or infected bladder since it helps to flush out harmful bacteria. Kelp helps reduce inflammation in injured tissues and ease painful joints in rheumatism and **rheumatoid arthritis**. Kelp may also reduce an enlarged prostate in men, and is also used to strengthen fingernails, prevent **hair loss**, and regenerate hair if the follicle is still alive.

In addition to its medicinal uses, kelp contains natural **antioxidants** that make it useful to the food industry in retarding spoilage. The cosmetics industry is also studying the effects of a gel derived from kelp in improving the elasticity of human skin.

Preparations

The kelp used medicinally in modern times is generally harvested in kelp farms. These farms help preserve the natural balance of the sea, which is disrupted when large amounts of naturally growing seaweed are removed. Farming kelp also helps to ensure that the kelp retains its nutritional value. Kelp loses valuable nutrients when it is washed ashore. When

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kelp is harvested, it is cut, dried, then ground into powder. It is this powder that is encapsulated or pressed into tablets.

Kelp is available in bulk form either dried or as a ground powder. It is also sold as granules, capsules, tablets, or tinctures. Granulated or powdered kelp can be added to food as a salt substitute.

The recommended daily dose for adults is 10–15 mg. Kelp can also be made into a tea. To create an infusion, 1 cup of boiling water is poured over 2-3 tsp of dried or powdered kelp. The tea is steeped for 10 minutes, and can be drunk three times daily.

Precautions

People should not gather wild kelp because it may contain contaminants absorbed from the sea.

People with high blood pressure or a history of thyroid problems should consult their healthcare practitioner before using kelp. The high sodium content of *Fucus vesiculosus* may make high blood pressure worse. Kelp isn't recommended for people on a low-sodium diet.

Excessive consumption of kelp can provide the body with too much iodine and interfere with thyroid function. Consumers should use it only as directed.

Side effects

There are no known side effects, but some people may be sensitive or allergic to kelp. Common allergic symptoms include mild stomachache.

Interactions

Fucus vesiculosus shouldn't be taken with thyroid medications.

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Khella

Definition

Khella *(Ammi visnaga)* is a member of the *Apiaceae* family, whose familiar members include carrot and **parsley**. Khella is an herbaceous annual native to North Africa, and naturalized to Australia, North and South America, and throughout the Middle East. It is grown in the United States, Mexico, Argentina, and Chile, and cultivated commercially in the former Soviet Union, Egypt, Morocco, and Tunisia. Khella has been known since ancient times and is mentioned in the *Ebers papyrus*, one of the oldest known medical works dating from 1500 B.C. Khella, so named by the Moors of North Africa, has many other common names reflecting both its folk use and appearance, including false queen Anne's lace, toothpick plant, green mist lace, and honey plant. The herb is sometimes called bishop's weed, though this is also the common name for a related plant, *Ammi majus L.* The Greek physician Dioscorides, author of *De Materia Medica* called the herb "ammi," meaning "sand," perhaps reflecting the common habitat of the herb.

Khella thrives in sunny fields and among cultivated crops in well-drained, sandy soil. It reaches heights from 2 to 3 feet and may spread as wide as 4 feet. It is self-fertile and pollinated by insects. The fern-like, finely cut, toothed leaves grow from erect, round, and furrowed stems that branch toward the top. The stems bear small greenish-white flowers in a rounded and clustered compound umbel that gives the appearance of fine lacework. The flowers are androgynous, containing both male and female reproductive parts. In damp conditions, the compound umbels open up, and when dry they close with a nest-like appearance. The pedicels of the flowers are stiff when dry and pleasant tasting. They have been traditionally used as tooth cleansers. The seeds are tiny, smooth, ovate to oblong, and bitter.

Active Constituents

The medically active constituents in khella are present in the fruit and seeds. A primary active constituent, the furanocoumarin khellin, is found in the fatty oil of the seed and was first isolated in crystalline form in 1879. Other furanocoumarins are visnagin and khellol. Other compounds include the flavonoids **quercetin**, kaemperot, and isorhamnetin, and the **essential oils** camphor, terpineol, terpinen, and linalool oxides, as well as fixed oils, psoralens (methoxypsoralen), and protein.

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General use

Khella acts therapeutically as a urinary tract antispasmodic, diuretic, hypoglycemic, lithontripic, selective coronary vasodialator, and bronchodilator. Khella has been used for decades as an effective remedy for various respiratory problems, including **asthma**, **bronchitis**, **emphysema**, and **whooping cough** and to treat arteriosclerosis and relieve the sharp **pain** of **angina** and pre-menstrual distress. An extract of the phytochemical khellin used as a topical gel has been shown to be helpful in treatment of vitiligo, a skin disease. Khella increases the sun sensitivity of melanocytes in the skin, thus stimulating repigmentation.

Khella's active constituents have been included in many commercial drug formulas used for dilating blood vessels. This use was based on research dating from the 1950s. However in 1994, the German Commission E, a committee of experts evaluating the safety and efficacy of herbs and herbal combinations, withdrew approval of khella for therapeutic use "due to the insufficiently proven efficacy of the drug and its pharmaceutical preparations, as well as the associated risks."

Khella was cultivated in the medicinal gardens of ancient Egypt where it was valued for relieving the pain and easing the passage of **kidney stones**. Its antispasmodic properties help relax bile duct constrictions and relax the muscle of the urethra, and khella has been shown to relax the coronary arteries thus improving the blood supply to the heart muscle.

Research

In 2001, scientists at Umm Al-Qura University in Saudi Arabia investigated the effect of *Ammi visnaga* seeds on experimentally induced kidney stones in albino rats. Daily oral treatment with 500 mg of the extract, according to researchers "highly reduced the incidence of nephrolithiasis (**calcium** oxalate deposition in the kidneys)." The seed extract also showed highly potent diuretic activity. The researchers offered a daily dosage of 60 ml of khella extract to human volunteers who complained of kidney stones. Researchers reported that "the patients confirmed the efficacy of *Ammi visnaga* treatment."

Preparations

Khella is commercially available in capsule form, as an essential oil, in liquid extract, tincture, and dried for use as a tea. For an infusion, individuals can use one teaspoon of crushed seeds per cup of water and steep for 25 minutes. Khella extract, standardized to contain a minimum of 12% of the phytochemical constituent khellin, is commercially prepared from the seeds with a dry seed/menstruum ratio of 1:3 using grain alcohol (60–65%) and distilled water. The recommended daily dosage is 120 to 160 mg.

KEY TERMS

Antispasmodic—Phytochemical agent that acts to relax muscular spasms, suppressing smooth muscle contractions and preventing or reducing incident of seizure.

Lithontripic—Phytochemical effect that acts to prevent the formation of kidney or gall stones and facilitates dissolution and removal when formed.

Melanocyte—The pigment-producing cell in the epidermis that produces malanin and determines skin color.

Vitiligo—A skin pigmentation disorder in which the melanocytes are destroyed leaving irregular patches of unpigmented skin, appearing most commonly on hands, feet, face and lips.

Precautions

Khella has been shown to have cumulative toxicity. Prolonged use may bring about **nausea** and **vomiting**, **headache**, **insomnia**, **constipation**, and vertigo. Externally, the sap of the plant may cause irritation and a painful skin rash. When used topically, particularly for prolonged periods, the phototoxic activity of khella may cause blistering in normal skin when exposed to the sun. Individuals should use this herb under the supervision of a healthcare professional as appropriate dosages will vary depending upon the condition being treated.

Contraindications

Khella should not be taken by patients using antiarrhythmics, anticoagulants, calcium channel blockers, and other antihypertensives. Khella may enhance the effects of these pharmaceuticals. Individuals should avoid using khella if they are pregnant or breast-feeding as effects are unknown. Khella may cause elevated liver function test results.

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Alternative Medicine Foundation, PO Box 60016, Potomac, MD, 20859, (301) 340-1960, http://www.amfoundation.org.

Food and Nutrition Information Center, National Agricultural Library, United States Department of Agriculture. 10301 Baltimore Ave., Room 105, Beltsville, MD, 20705, (301) 504-5414, http://fnic.nal.usda.gov.

Clare Hanrahan

Kidney infections

Definition

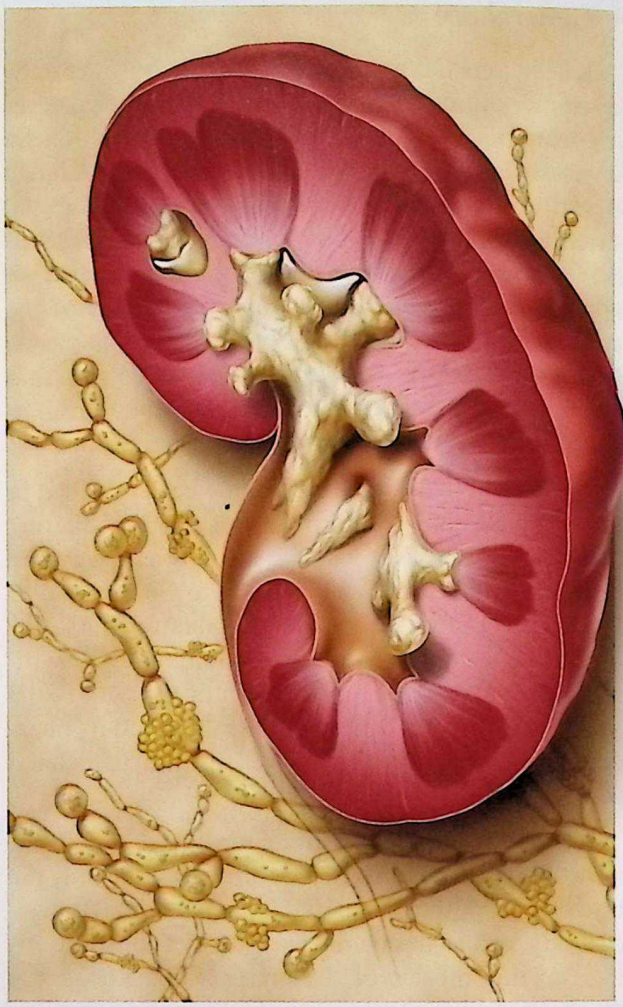
Kidney infection is a general term used to describe infection of the kidney by bacteria, viruses, or fungi. The infecting microbe may have invaded the kidney from the urinary bladder or from the bloodstream. The disease is characterized by **fever**, **chills**, back **pain**, and, often symptoms associated with **bladder infection**.

Description

The kidneys are bean-shaped organs located in the abdominal cavity on the right and left side of the lower back. As the principle part of the urinary system, the kidneys process the fluid component of blood (plasma) to maintain appropriate water volume and concentrations of chemicals (electrolytes). Urine is the waste product formed from this process. Urine flows from each kidney through a tube called a ureter to the urinary bladder, and is removed from the body through a tube called the urethra. The kidneys and ureters comprise the upper urinary tract, and the bladder and urethra comprise the lower urinary tract.

Kidney infection, also called pyelonephritis and upper urinary tract infection, occurs when microbes, usually bacteria, invade the tissues of the kidney and multiply. One or both kidneys may be infected. Infection originating directly from the bladder is called an ascending infection.

Inflammation occurs in response to the infection. As a result of the infection and inflammation, scarring and other tissue damage may occur. Most cases of acute kidney infection resolve without any permanent kidney damage. In severe cases, kidney damage is so extensive that the kidneys can no longer function, a state called renal failure.



Kidney infected with candida cast, yeast-like fungi. *(Brian Evans / Photo Researchers, Inc.)*

There are several types of kidney **infections**.

- Acute pyelonephritis: uncomplicated kidney infection which has a short and relatively severe course.
- Chronic pyelonephritis: long-standing disease associated with either active or inactive kidney infection.
- Emphysematous pyelonephritis: acute infection associated with gas in and around the kidney. This type almost always occurs in persons with diabetes.
- Pyonephrosis: acute or chronic pyelonephritis associated with blockage of the ureter.
- Renal and perinephric abscesses: abscesses (pockets of pus) in and around the kidney.

Kidney infections occur most often in adult women who are otherwise healthy. Urinary tract infections are uncommon in men until old age when bladder

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catheterization and other urinary procedures are more commonly performed.

Causes and symptoms

Kidney infection is usually caused by bacteria, although infection by fungi (yeasts and molds) or viruses does occur. The bacteria *Escherichia coli (E. coli)* is responsible for about 85% of the cases of acute pyelonephritis. However, *E. coli* causes only 60% of the acute pyelonephritis cases in the elderly.

Other common causes include *Klebsiella*, *Enterobacter*, *Proteus*, *Enterococcus*, and *Pseudomonas* species. Infection by *Proteus* species can lead to the formation of **kidney stones**.

Kidney infection may also be caused by *Mycobacteria tuberculosis* or other Mycobacteria species or by the yeast *Candida*. Kidney infection also can be caused by Group B Streptococci in newborns.

Certain women are inherently more susceptible to urinary tract infections. Researchers have found that women who have recurrent infections possess certain markers on their blood cells. Also, the bacteria that commonly cause urinary tract infections stick more readily to the vaginal cells of women who have recurrent infections.

Other risk factors for developing kidney infections include:

- bladder catheterization, a common cause of bladder and kidney infections in hospitals.
- diabetes
- pregnancy
- urinary calculi (stone)
- urinary tract abnormalities
- urinary tract obstruction

The symptoms of kidney infection include fever, shaking chills, **nausea**, **vomiting**, and middle to lower back pain that may travel to the abdomen and groin. This pain may be severe. These symptoms may be preceded or accompanied by those associated with bladder infection—frequent, painful urination.

Infants and young children may have fever, irritability, straining on urination, and unusual urine odor. Fewer than half of newborns have fever associated with kidney infection, which makes diagnosis difficult.

In more than 20% of elderly patients with kidney infection, the presenting symptoms are gastrointestinal or pulmonary (lung). Also, one third of elderly patients do not develop fever.

Diagnosis

Kidney infections can be diagnosed by family physicians, obstetrics and gynecology (OB/GYN) doctors, and urologists (doctors who specialize in the urinary system). The diagnosis of kidney infection is based primarily on symptoms, urinalysis, and urine cultures. Blood tests may also be performed. Approximately 20% of patients have bacteria in the bloodstream, a condition called bacteremia. Urine dipsticks that detect signs of infection are often used right in the doctor's office. Urine also is examined with a microscope for the presence of bacteria and leukocytes (white blood cells). Urine culture can identify which microbe is causing the infection and may also be used to determine which antibiotic would be most effective.

Other diagnostic procedures may be used to look for signs of infection in the kidney. An x ray of the abdomen may be taken. Ultrasound, which uses sound waves to visualize internal organs, may be used to examine the bladder and kidney. Less routinely performed are intravenous urograms, computerized tomography (CT scan), and scintillation scans.

Treatment

Delays in the diagnosis and treatment of kidney infection can lead to permanent kidney damage. The person who suspects kidney infection should seek professional care immediately, as antibiotics are essential to control the infection. Alternative medicine may be used as an adjunct to the appropriate antibiotic treatment.

Dietary changes that may help to control and prevent kidney infection.

- Drinking 8–12 glasses of water daily helps to wash out bacteria, although this also may dilute antibacterial factors in the urine.
- Acidifying the urine by eating few alkaline foods such as dairy.
- Following a diet rich in whole grains, vegetables, and acidifying juices, such as citrus and cranberry.
- Eliminating high sugar foods.
- Drinking unsweetened cranberry juice to acidify the urine and provide the antimicrobial agent hippuric acid. In controlled studies, cranberry extract capsules did not provide the same benefit as cranberry juice. Studies have shown that cranberry juice helps suppress the growth of certain bacteria and reduces urinary tract infection by making it more difficult for bacteria to stick to the lining of the ureter and bladder.

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- Ingesting at least one clove of garlic or up to 1,200 mg garlic as a tablet daily for its alleged anti-infective properties.

Magnesium supplementation may help prevent the formation of kidney stones and thus indirectly prevent kidney infection by preventing urinary tract blockage. **Zinc** may boost the immune system. A study in rats with ascending pyelonephritis found that the addition of vitamins A and E to standard antibiotic therapy significantly reduced kidney inflammation as compared to antibiotic treatment alone. This effect has not been tested in humans.

Traditional Chinese medicine treats pyelonephritis with **acupuncture**, herbals, and patent medicines. The Chinese patent medicine Zhi Bai Di Huang Wan (**Anemarrhena**, Phellodendron, and Rehmannia Pill) is often used to treat kidney infections and disease and bladder infections. The patient can take eight pills three times daily. Herbs such as *Semen Abutili seu Malvae, Semen plantaginis,* and *Herba lygodii japonici* are used to treat or prevent the formation of kidney stones.

In traditional Chinese medicine, treatment of urinary tract infection often uses one or more of the following herbs in doses of 30 g to 60 g taken once or twice daily. Patients should consult a traditional Chinese medical practitioner for the treatment best suited for them:

- Herba commelinae
- H. plantaginis
- H. patriniae
- H. salviae plebeiae
- H. hedyotis seu oldenlandiae
- H. taraxaci
- H. andrographis

Allopathic treatment

Initiating antibiotic therapy as soon as possible is critical to prevent or reduce damage to the kidneys. Historically, all pyelonephritis patients were treated in the hospital. This is no longer considered necessary. Responsible patients with mild kidney infection can be treated at home with antibiotics taken by mouth. Patients with high fever, vomiting, evidence of bacteria in the bloodstream, and/or dehydration should be hospitalized in order to receive intravenous (IV) antibiotics and fluids. Severe illness, either with or without complications, requires hospitalization for treatment.

The recommended treatment for acute pyelonephritis is two weeks of therapy with the antibiotic combination trimethoprim/sulfamethoxazole. Fluoroquinolones (Cipro, Noroxin, NegGram), ceftriaxone (Rocephin), or gentamicin are other choices. Fluoroquinolones should not be used by pregnant women or children. With treatment, symptoms normally resolve within two to three days. Patients must, however, take the full two-week course of antibiotics so that the infection does not recur.

Abscesses may be treated with percutaneous (by a needle through the skin) or surgical drainage. Emphysematous pyelonephritis may be treated with antibiotics, however, surgical removal of the kidney (nephrectomy) may be necessary (individuals can, however, live normally with only one kidney). Because of the 75% death rate, nephrectomy is the treatment of choice in people with diabetes who have emphysematous pyelonephritis. Kidney stones are most often treated with extracorporeal shock wave lithotripsy (ESWL). Shock (sound) waves are aimed at the stone. The energy in the shock waves causes the stone to vibrate and fragment into small pieces that can be more easily passed.

Expected results

Antibacterial therapy of kidney infection has a 90% cure rate. Severe or chronic infection can lead to kidney damage and renal failure. Renal failure requires hemodialysis, a process that uses a dialysis machine (an artificial kidney) to process the patient's blood and remove waste products several times a week. Patients with severe kidney damage require kidney transplantation.

Prevention

Researchers are trying to develop a vaccine for urinary tract infections (UTIs), but as of 2008, none were available in the United States. The key to preventing kidney infection is to promptly treat bladder infection. Measures taken to prevent bladder infection may prevent subsequent kidney infection. These include:

- drinking large amounts of fluid
- reducing intake of sugar
- voiding frequently and as soon as the need arises
- proper cleansing of the area around the urethra (females), especially after sexual intercourse
- acupuncture (effective in preventing recurrent lower UTIs in women)
- avoiding use of vaginal diaphragms and spermicidal jelly (females)

The primary preventive measure specifically for men is prompt treatment of prostate infections. Chronic prostatitis may go unnoticed but can trigger recurrent UTIs. In addition, men who require temporary catheterization following surgery can be given antibiotics to lower the risk of UTIs.

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KEY TERMS

Ascending infection—Infection which begins in the urinary bladder and travels through the ureters up to the kidneys.

Electrolyte—ions in the body that participate in metabolic reactions. The major human electrolytes are sodium (Na+), potassium (K+), calcium (Ca 2+), magnesium (Mg2+), chloride (Cl-), phosphate (HPO4 2-), bicarbonate (HCO3-), and sulfate (SO4 2-).

Hemodialysis—The blood processing procedure used when kidney function is lost. Blood is removed from a vein, processed through a dialysis machine (artificial kidney), and put back into a vein.

Nephrectomy—Surgical removal of a kidney.

Percutaneous—Medical procedure that is performed through the skin using a needle. Abscess drainage and urinary stones may be treated percutaneously.

Pyelonephritis—Infection and inflammation of the kidney.

Renal failure—A state when the kidneys are so extensively damaged that they can no longer function.

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American Association of Oriental Medicine. PO Box 162340, Sacramento, CA 95816. (866) 455-7999 or (914) 443-4770 http://www.aaaomonline.org.

American Holistic Medical Association. PO Box 2016 Edmonds, WA 98020. 425-967-0737. *http://www.holisticmedicin.org*.

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Kidney stones

Definition

Kidney stones are solid accumulations of material that form in the tubal system of the kidney. Kidney stones cause problems when they block the flow of urine within the kidney or urinary tract. When the stones move through the ureter, they can cause severe **pain**.

Description

Urine is formed by the kidneys. Blood flows into the kidneys, and nephrons (specialized tubes) within the kidneys allow a certain amount of fluid from the blood, along with certain substances dissolved in that fluid, to flow out of the body as urine. Sometimes, a problem causes the dissolved substances to become solid again. Tiny crystals then form in the urine, meet, and cling together to create a larger solid mass called a kidney stone.

Many kidney stones are small enough that the kidney continues to function normally, and the stones never cause any pain. These are called "silent stones." Kidney stones cause problems when they interfere with the normal flow of urine. They can obstruct (block) the flow through the ureter. The kidney is not accustomed to experiencing any pressure. When pressure builds from backed-up urine, the kidney may swell (hydronephrosis). If the kidney is subjected to this pressure for some time, there may be damage to delicate kidney structures. When the kidney stone is

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X ray showing a kidney stone. *(Custom Medical Stock Photo. Reproduced by permission.)*

lodged further down the ureter, the backed-up urine may also cause the ureter to swell (hydroureter). Because the ureter is a muscular tube, the presence of a stone makes the tube spasm, causing severe pain.

About 10% of all people have a significant kidney stone during their lifetime. Kidney stones are most common among white men over age 30, people who have previously had kidney stones, and people whose family members are prone to developing kidney stones. Eating a lot of animal protein and drinking too few fluids are also thought to contribute to the development of kidney stones.

Causes and symptoms

Kidney stones can be composed of a variety of substances. The most common types of kidney stones are described here.

Calcium stones

About 80% of all kidney stones are **calcium** stones. These stones are composed of either calcium and phosphate, or calcium and oxalate. People with calcium stones may have other diseases that cause them to have increased blood levels of calcium. These diseases include primary parathyroidism, sarcoidosis, **hyperthyroidism**, renal tubular acidosis, multiple myeloma, hyperoxaluria, and some types of **cancer**.

Struvite stones

Struvite stones account for 10% of all kidney stones. Struvite stones are composed of **magnesium** ammonium phosphate. These stones occur most often in patients who have had repeated urinary tract **infections** caused by certain types of bacteria. These bacteria produce a substance called urease that increases the urine pH and makes the urine more alkaline. This chemical environment allows struvite to settle out of the urine, forming stones.

Uric acid stones

About 5% of all kidney stones are uric acid stones. These occur when increased amounts of uric acid circulate in the bloodstream. When the uric acid content becomes very high, it can no longer remain

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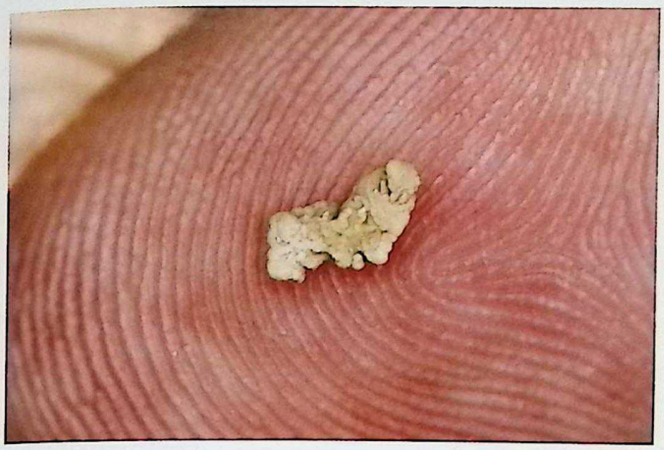

Kidney stone on a human finger tip. *(Stephen J. Krasemann / Photo Researchers, Inc.)*

dissolved and solid particles of uric acid settle out of the urine. A kidney stone is formed when these particles cling to each other within the kidney, slowly forming a solid mass. About half of all patients with this type of stone also have deposits of uric acid elsewhere in their bodies, commonly in the joint of the big toe. This painful disorder is called **gout**. Other causes of uric acid stones include chemotherapy for cancer, bone marrow disorders in which certain types of blood cells are over-produced, and an inherited disorder called Lesch-Nyhan syndrome.

Cystine stones

Cystine stones account for 2% of all kidney stones. Cystine is a type of amino acid, and people with this type of kidney stone have an abnormality in the way their bodies process **amino acids** in the diet.

Patients who have kidney stones usually do not have symptoms until the stone passes into the ureter. Before this, some people may notice blood in their urine. Once the stone is in the ureter, however, most people experience bouts of very severe pain. The pain is crampy, spasmodic, and intense. It usually begins in the flank region, the area between the lower ribs and the hip bone. As the stone moves closer to the bladder, a patient will often feel the pain radiating along the inner thigh. Women may feel the pain in the vulva, while men often feel pain in the testicles. **Nausea**, **vomiting**, frequent and painful urination, and blood in the urine are common. **Fever** and **chills** usually mean that the ureter has become obstructed, allowing bacteria to become trapped in the kidney and cause a kidney infection (pyelonephritis).

Diagnosis

Most often in a healthy adult, diagnosis of kidney stones is based on the patient's pattern of severe, distinctive pain. Diagnosis may include laboratory examination of a urine sample and an x-ray examination. During the passage of a stone, examination of the urine usually reveals blood. A number of imaging tests can, if necessary, be used to diagnose kidney stones. A plain x ray of the kidneys, ureters, and bladder may or may not reveal the stone. A series of x rays taken after injecting **iodine** dye into a vein is usually a more reliable way of seeing a stone. This procedure is called an intravenous pyelogram (IVP). The dye "lights up" the urinary system as it travels. In the case of an obstruction, the dye will be stopped by the stone or will only be able to get past the stone at a slow trickle. This test is not often used in the twenty-first century since less invasive imaging tests are available. An ultrasound can also be used to detect renal blockage. The use of computed tomography (CT) scans has been added to diagnose of some kidney stones.

When a patient is passing a kidney stone, the urine is strained through a special sieve to catch the stone. If the stone can be located (often it cannot), it can then be sent to a laboratory for analysis to determine the chemical composition of the stone. After the kidney stone has been passed, other tests may be done to understand the underlying condition that may have caused the stone to form. Collecting urine for 24 hours, followed by careful analysis of its chemical makeup, can often determine the reason for stone formation.

Treatment

It is believed that stones will pass more quickly if the patient is encouraged to drink large amounts of water (2–3 quarts per day). **Cranberry** (*Vaccinium macrocarpon*) juice has been a traditional remedy for the treatment and prevention of kidney stones. Although good-quality clinical trials have found that cranberry juice has some effect on urinary tract infections, its effectiveness in treating kidney stones is unproven.

Herbal remedies that have anti-lithic (stone-dissolving) action can assist in dissolving small kidney stones. These include gravel root (*Eupatorium purpureum*), hydrangea (*Hydrangea aborescens*), and wild carrot (*Daucus carota*). Starfruit (*Averrhoa carambola*) is recommended to increase the amount of urine a patient passes and to relieve pain.

A Chinese herbal practitioner may use herbs such as *Semen Abutili seu Malvae*, *Semen plantaginis*, and *Herba lygodii japonici* for urinary stones. Dietary

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Human male calcium oxalate kidney stone. *(© Steve Sant / Alamy)*

KEY TERMS

Diuretic—A substance that removes water from the body by increasing urine production.

pH—A measure of the acidity of a fluid. On a scale of 1 to 14, a pH of 7 is neutral. Higher pH readings are alkaline and lower pH readings are acidic.

Ureter—A tube that carries urine from the kidney to the bladder.

changes can be made to reduce the risk of future stone formation and to facilitate the resorption of existing stones. Supplementation with magnesium, a smooth muscle relaxant, can help reduce pain and facilitate stone passing. **Guided imagery** may also be used to help relieve pain. Large stones may require conventional medical intervention.

Allopathic treatment

The pain associated with a kidney stone sends most patients to the emergency room, and a patient with a kidney stone will say that the most important aspect of treatment is adequate pain relief. Because the pain of passing a kidney stone is so severe, narcotic pain medications are usually required. If the patient is vomiting or unable to drink fluids because of the pain, it may be necessary to provide intravenous fluids and anti-emetics (drugs that stop vomiting). If symptoms and urine tests indicate the presence of infection, antibiotics are required.

Although most kidney stones pass on their own, some do not. The preferred method of treatment is extracorporeal shock wave lithotripsy (ESWL). Shock waves are aimed at the stone. The energy of the shock waves causes the stone to vibrate and fragment into small pieces that can be more easily passed. This procedure is generally done under light anesthesia because the shock waves cause pain. If the stone is lodged in the ureter, the urologist may insert a device into the ureter that can direct laser or ultrasound energy at the stone and pulverize it. If the stone is large and ESWL does not work, the stone may be removed by minimally invasive surgery.

Expected results

A patient's prognosis depends on the underlying disorder causing the development of kidney stones. In most cases, patients with uncomplicated calcium stones recover very well. About 60% of these patients, however, will have other kidney stones. Struvite stones are particularly dangerous because they may grow extremely large, filling the tubes within the kidney. These are called staghorn stones and will not pass out in the urine. They require surgical removal. Uric acid stones may also become staghorn stones.

Prevention

Prevention of kidney stones depends on the type of stone and the presence or absence of an underlying disease. In almost all cases, increasing fluid intake so that a person consistently drinks 2 to 3 quarts (liters) of water a day is an important preventative measure. Drinking a glass of lemonade made with real lemons or real lemon concentrate also helps increase the amount of citrate in the urine. Citrate makes it more difficult for kidney stones to form.

People with calcium oxalate stones do not need to reduce the amount of calcium in their diet but may reduce the amount of foods containing oxalate. These foods include rhubarb, star fruit, beets, beet greens, collards, okra, refried beans, spinach, Swiss chard, sweet potatoes, sesame seeds, almonds, and soy products. A vegan diet or one very low in animal products also is effective in preventing kidney stones, especially when combined with a very low salt diet.

People prone to form kidney stones may also be given medication to help prevent their formation. A thiazide diuretic can help prevent the formation of calcium stones. Allopurinol (Zyloprim, Aloprim) reduces the amount of uric acid blood and urine and helps prevent the formation of uric acid stones. Sturvite stones often form when the kidney becomes infected, so preventing infection also helps to prevent stone formation. Cystine stones are difficult to prevent.

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American Association of Oriental Medicine, PO Box 162340, Sacramento, CA, 95816, (866) 455-7999, (914) 443-4770, http://www.aaaomonline.org.

American Holistic Medical Association., PO Box 2016, Edmonds, WA, 98020, (425) 967-0737, http://www.holisticmedicine.org.

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Kinesiology *see* **Applied kinesiology**

Kirlian photography

Definition

Kirlian photography creates a photographic image by placing the object or body part to be photographed on film or photographic paper and exposing it to an electromagnetic field.

Origins

Although experiments with photographing objects exposed to an electrical field are known to have been carried out as early as the 1890s, Kirlian photography is generally said to have originated with the work of a pair of Soviet scientists, Semyon and Valentina Kirlian, beginning around 1939. Over the next several decades at Kazakh State University, the Kirlians developed electrophotographic techniques which used neither a lens nor a camera. By the 1960s, their work had attracted public attention in the Soviet Union. Interest in Kirlian photography spread to the West during the 1970s, where attempts were made to replicate effects achieved in photographs of Alexei Krivorotov, a well-known psychic healer in the U.S.S.R. In the United States, studies were carried out with psychic healers at the Jerrey Society for Parapsychology and the UCLA Neuropsychiatric Institute.

Kirlian photograph of a hand. *(© Andrew Wakeford / Alamy)*

Benefits

The most common therapeutic use of Kirlian photography is as a diagnostic tool. Variations in the shapes, colors, and intensity of the images produced are said to provide clues to the patient's overall health and energy level and to indicate the presence or absence of disease, specific emotional states, and other physiological or psychological conditions.

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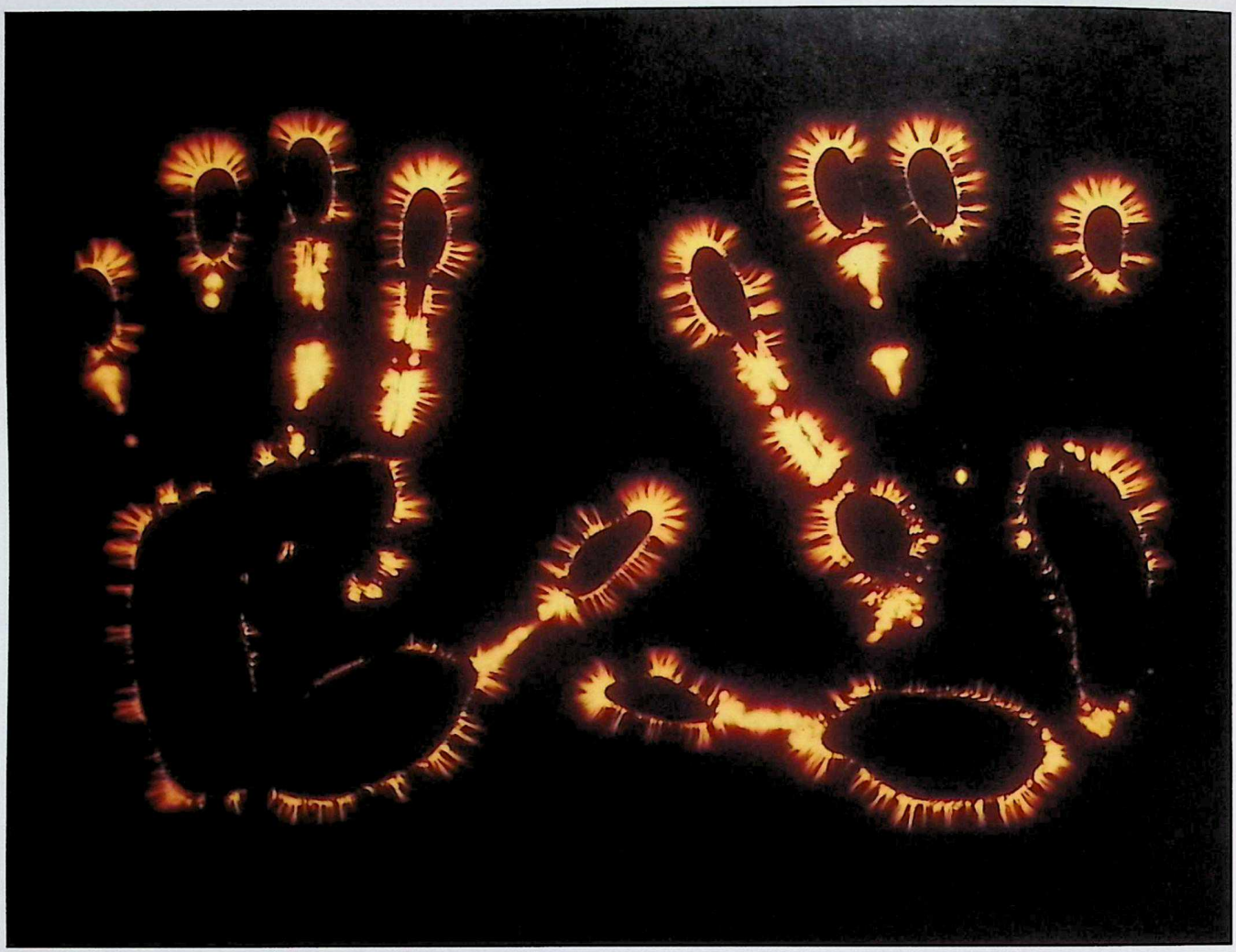

Kirlian photograph of the palms of a woman's hands. *(© Photo Researchers, Inc. Reproduced by permission.)*

Description

Practitioners most often photograph the patient's hand (or, less frequently, the foot), which rests on a photographic medium placed over an electrically charged metal plate. During the approximately one-minute exposure, the patient may feel tingling in the exposed surface. After developing the image, the practitioner interprets its significance and, if necessary, refers the patient to a health-care provider for treatment. Kirlian photography is also sometimes used to assess the effectiveness of treatments (such as **acupuncture**) by comparing before and after photographs of the patient.

Research and general acceptance

Although some have speculated that Kirlian photography actually records the aura long said by some mystics and psychic healers to exist around human beings, this is not a generally accepted viewpoint. A scientific explanation of these dramatic images is that they result from interactions between charged particles created by the electromagnetic field used to form the images. A 1976 *Science* article concluded that moisture is a principal determinant of the form and color of human Kirlian photographs.

It has also been noted that variations in a variety of factors, including the amount of pressure on the plate, the voltage and frequency, and the exposure time, moisture, and temperature, can all influence the images produced.

For these reasons, as well as claims of unreliability and a lack of research data supporting its use, Kirlian photography is not recognized as a legitimate diagnostic tool by the mainstream medical community.

Nevertheless, individual practitioners and researchers continue to experiment with Kirlian photography for diagnosis, especially in Russia and Eastern Europe. It

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has also been used for nonmedical purposes, such as detecting flaws in metal and determining the viability of seeds.

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Peter Gregutt

Knee pain

Definition

Knee **pain** refers to any aching or burning pain of the knee joint. Knee pain can be a symptom of numerous conditions and diseases including knee **stress**, **osteoarthritis**, injury, **gout**, infection, and **bursitis**.

Description

Knee pain is very common. Each year, millions of Americans visit the doctor for knee pain. It is the most frequent reason for visits to an orthopedist (bone and joint surgeon).

To understand the various causes of knee pain, it is important to know how the knee functions. The knee refers to the joint where the femur (thigh bone) meets the tibia (largest lower leg bone). In front of this joint lies the patella (knee cap). The joint is lined by a membrane called a synovial sac. The synovial sac produces synovial fluid which acts as a lubricant much in the way that oil lubricates the moving parts of machinery. Other tissues that make up the knee joint include cartilages, muscles, tendons, and ligaments. The upper end of the tibia has cartilaginous shock absorbers called "menisci" (meniscus). Other protective structures are the bursae, which cushion areas of friction in the joint. Most of the muscles involved with joint mobility originate in the thigh, cross the knee joint, and attach to the tibia.

The knee supports two to three times a person's body weight. It is a complex joint that allows for a considerable range in mobility. In addition to simple flexion (bending) and extension (straightening) movements, the knee joint is designed to allow for rotation, gliding, and rolling movements. To allow for complex mobility and joint stability, joint strength is sacrificed, making the knee very prone to injury.

X ray of an arthritic knee showing narrowing of the joint space with sclerotic changes in an 84 year old woman. *(© PHOTOTAKE Inc./ Alamy)*

Causes and symptoms

Knee pain is a symptom of many different diseases and conditions. Short-term knee pain may be the result of excess stress on the knee. Possible causes of knee pain include:

- Arthritis. Osteoarthritis (joint degeneration), rheumatoid arthritis (joint inflammation), and septic arthritis (joint infection) can cause knee pain.
- Bursitis. Inflammation of the bursae of the knee can cause knee pain. Bursitis can be caused by infection, gout, rheumatoid arthritis, injury, illness, or chronic irritation (crawling or kneeling)

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KEY TERMS

Bursae—Sacs of fluid that serve to cushion areas of friction in joints.

Decoction—Concentration of an herb obtained by boiling it down.

Ligament—A fibrous band of tissue connecting cartilage or bones that serves to strengthen and support joints.

Meniscus—Crescent-shaped disks of cartilage located on the head of the tibia that serve as shock absorbers.

Tincture—A medicinal solution consisting of an herb and alcohol mixture.

- Cysts. A cyst is a fluid-filled sac. Cysts associated with the knee can cause swelling and knee pain or discomfort.
- Fracture. Breakage or crack in any of the bones associated with the knee joint can cause knee pain.
- Gout. A faulty chemical process leads to high levels of uric acid in the blood which causes inflammatory arthritis, crystal deposits in joints, joint destruction, and joint pain.
- Ligament injury or instability. The ligaments supporting the knee may be injured or strained by persons who participate in sports, particularly football, rugby, lacrosse, basketball, skiing, soccer, and volleyball. Other accidents can also cause ligament damage.
- Loose bodies. This condition refers to any loose objects that float around the knee and cause problems. They also are called "joint mice" because of their elusive nature.
- Meniscus conditions. Damage, usually in the form of a tear, to the menisci can be caused by degenerative changes associated with advancing age or sports-related injury. Sports that commonly cause menisci damage include football, basketball, soccer, tennis, lacrosse, and skiing.
- Osteonecrosis. Degeneration of the bones associated with the knee cause pain and deformity.
- Patellofemoral pain. Also known as anterior knee pain syndrome, this condition is characterized by pain around the knee cap. The exact cause of patellofemoral pain is unknown but is probably related to muscle inadequacy, lack of flexibility, rapid growth, or bone positioning.

Diagnosis

Knee pain can be diagnosed and treated by an orthopedic surgeon. Diagnosis is based primarily on medical history and physical exam. The diagnosis begins with a detailed medical history to fully characterize the knee pain. The knee will be bent to determine the range of motion and palpated (felt with the hands) to detect the presence of any abnormalities. The physical exam may include any of a number of different tests designed to detect injuries by manipulating the knee and leg. X rays may be taken. In some cases more advanced testing may be carried out using magnetic resonance imaging (MRI), computed tomography (CT), or contrast arthrography (x ray following injection of a contrast solution).

Treatment

Most alternative treatments for knee pain aim at reducing pain, inflammation, and stiffness. Persons experiencing long-term or severe knee pain should consult a physician to determine the underlying cause.

Herbals

Several herbal remedies are recommended to relieve knee pain. Some remedies are used externally, while others involve internal use of herbs.

The following herbs may relieve knee pain and/or associated symptoms when used externally:

- basil and sage oil rub: knee pain
- comfrey (*Symphytum officinale*) oil rub: joint stiffness and aching joints
- eucalyptus (*Eucalyptus globulus*) essential oil rub: swelling
- ginger (*Zingiber officinale*) root hot compress or bath: joint stiffness, arthritis, and degenerative joint disease
- lavender (*Lavandula officinalis*) essential oil rub: joint stiffness and aching joints
- mustard (*Sinapsis alba*) powder bath or paste (with alcohol): knee pain
- red pepper (*Capsicum*) lotion: arthritic pain and swelling
- St. John's wort (*Hypericum perforatum*) oil rub: joint stiffness and aching joints
- wintergreen (*Gaultheria procumbens*) oil rub: chronic pain

The following herbs may relieve knee pain and/or associated symptoms when used internally:

- celery (*Apium graveolens*) decoction or tincture: swollen joints and gout

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- chamomile (*Matricaria recutita*): spasms and swelling
- deadly nightshade (*Atropa belladonna*) plaster: swollen joints
- devil's claw (*Harpagophytum procumbens*) tablets: swollen joints
- flaxseed (*Linus usitatissimum*) oil: lubricates joints
- feranium (*Pelargonium odoratissimum*): chronic pain
- jamaican dogwood (*Piscidia erythrina*): pain and swelling
- lemon (*Citrus limon*) juice: swollen joints
- prickly ash (*Zanthoxylum americanum*) tea: joint pain
- white willow (*Salix alba*) tablets or decoction: swollen joints and joint pain
- wild lettuce (*Lactuca virosa*): pain and swelling

Other remedies

Various other alternative treatments that can be helpful in relieving knee pain include:

- Acupressure. Pressing the Stomach 36 point located below the knee caps tones muscles and relieves joint pain anywhere in the body. Pressing the Spleen 9 points located below the kneecap on the inside of each leg relieves knee pain.
- Acupuncture. Inflammation and pain may be relieved by acupuncture. The large intestine meridian is the most effective channel for pain relief. A National Institutes of Health consensus panel found that acupuncture may be an effective treatment for osteoarthritis pain.
- Aromatherapy. Aromatherapy with essential oils is sometimes recommended. The essential oil of peppermint relieves pain and decreases inflammation. The essential oil of rosemary relieves pain and relaxes muscles.
- Chinese medicine. Knee sprain and contusion (bruise) are treated by application of *Shang Ke Xiao Yan Gao* (Relieve Inflammation Paste of Traumatology) and ingestion of *Die Da Wan* (Contusion Pill). Once the initial pain and swelling have been reduced, the patient can apply *Shang Shi Zhi Tong Gao* (Relieve Damp-Inducing Pain Medicinal Plaster).
- Exercise. Regular moderate exercise can reduce pain by improving the strength, tone, and flexibility of muscles. The endorphins released while exercising may also be helpful.
- Food therapy. Following a detoxification diet may restore nutritional balance to the body and relieve joint pain. Animal proteins may induce joint pain caused by inflammatory conditions, such as arthritis, so following a vegetarian diet may be helpful.
- Homeopathy. Rhus toxicodendron is recommended for joint and arthritis pain that is worse in the morning and relieved by warmth. Kali bichromicum is indicated for persistent, severe pain. Other homeopathic remedies can be designed for specific cases by a homeopathic practitioner.
- Hydrotherapy. A warm compress can relieve joint stiffness and dull pain. A cold compress or ice pack can relieve sharp, intense pain.
- Magnetic therapy. Magnetic fields may increase blood flow and block pain signals.
- Massage. Joint pain may be relieved by massaging the area above and below the painful joint. Massaging with ice packs may interfere with pain signals and replace them with temperature signals.
- Reflexology. Knee pain may be relieved by working the knee reflex points.
- Rolfing. This deep, sometimes painful, massage therapy may speed healing and reduce pain.
- Supplements. Knee pain may be relieved by taking vitamin C to promote healing, the B vitamins to balance the nervous system, which reduces pain, and calcium to increase bone strength.

Allopathic treatment

Knee pain may be relieved by taking nonsteroidal anti-inflammatory drugs such as acetaminophen (Tylenol), ibuprofen (Advil, Motrin), or naproxen (Aleve). More severe pain may be treated with prescription pain relievers such as tramadol or a narcotic. Additional treatment for knee pain depends upon the underlying cause and may include injection of drugs into the knee, surgery, wearing a brace, and/or physical therapy. Surgical treatment depends on the cause, but in the case of osteoarthritis, some patients face actual replacement of the joint. However, in 2002, a new device was introduced that postponed the need to replace an arthritic knee. The device is made of chrome and fits between the natural structures of the knee.

Expected results

Most causes of knee pain respond well to conservative treatments and resolve within 4–6 weeks. Knee pain caused by injury or disease may require surgery and lengthy rehabilitation.

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Prevention

Strengthening the leg muscles may help prevent knee pain caused by overworking the joint. In addition, a stronger knee may prevent injury to the joint. Squats are an easy **exercise** that will strengthen the quadriceps (front thigh muscles) and hamstrings (back thigh muscles). The **yoga** warrior posture strengthens the muscles around the knee and increases range of motion.

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Belinda Rowland
Teresa G. Odle

Kneipp wellness

Definition

Kneipp wellness is a holistic system for overall health developed by Sebastian Kneipp, a nineteenth-century Bavarian priest. His approach includes aspects of **hydrotherapy**, herbalism, and aerobic **exercise**.

A couple at the Kneipp Wellness bathing village of Bad Mergentheim in Baden Württemberg, Germany. *(© mediacolor's/ Alamy)*

Origins

Sebastian Kneipp was born to a poor family in Stephansreid, Bavaria, on May 17, 1821. He initially took up his father's trade of weaving, but longed to become a priest. With help from a sympathetic clergyman, he was admitted to high school as a mature student, but after five years of intensive studies, Kneipp became seriously ill with pulmonary **tuberculosis**. At that time, the disease was usually fatal, but Kneipp came across an eighteenth-century book about hydrotherapy that inspired him during the winter of 1849 to immerse himself several times a week in the icy Danube River. These brief exposures to cold water seemed to bolster his immune system, because Kneipp's tuberculosis went into remission and he was able to continue his theological studies in Munich. There, he convinced some of his fellow students to join his experiments with hydrotherapy.

Kneipp was ordained as a priest in 1852. In that capacity, he began using hydrotherapy to help some of his poorer parishioners. He broadened his approach to include herbalism, exercise, and other elements, and toned down his initial enthusiasm for shocking the body with cold water. "I warn all against too-frequent application of cold water," he later wrote. "Three times I concluded to remodel my system and relax the treatment from severity to mildness and thence to greater mildness still." Kneipp's reputation grew after a number of dying patients recovered when he was called to administer last rites

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KEY TERMS

Hydrotherapy—A family of therapies that treat illness by using water either externally or internally.

Phytotherapy—A form of treatment that uses plants or plant extracts either externally or internally.

and managed instead to restore them to health. In 1855 he was assigned to Worishofen, a village in the foothills of the Bavarian Alps that soon developed an international reputation as a place of healing. Kneipp summarized his teachings in two popular books, *My Water Cure* in 1886 and *So Sollt Ihr Leben (Thus Thou Shalt Live)* in 1889. Supporters of his techniques formed Kneipp Societies in Germany and the United States.

Father Kneipp was later named a monsignor by Pope Leo XIII. After his death in Worishofen on June 17, 1897, his wellness techniques became less popular, but interest in hydrotherapy increased again during the latter part of the twentieth century.

Benefits

Proponents of Kneipp therapy believe that it bolsters the immune system and results in improved overall wellness. In Germany, it is especially popular for treating **varicose veins**.

Description

Today, Kneipp physiotherapy is essentially a form of classical naturopathy. It is founded on five "pillars":

- Hydrotherapy. Hydrotherapy involves the use of hot and cold water to stimulate the nerves, blood vessels and internal organs. It uses baths, compresses, packs, and water jets.
- Phytotherapy. Plant therapy takes the form of medicinal herbs added to bath water and also administered as juices, lozenges, teas, or ointments, etc.
- Exercise therapy. This aspect of treatment involves long hikes, gymnastics, tennis, cycling, and other vigorous activities to amplify the effects of the water and herb therapies.
- Nutrition therapy, which employs a low-protein, high-fiber diet. Special Kneipp diets are also available for weight loss or such ailments as gout, diabetes, or metabolic problems.
- Health maintenance therapy. Patients in the Kneipp program are trained to adhere to their natural biorhythms.

Precautions

All forms of hydrotherapy may pose some risk of water-borne **infections**, and patients should make sure that baths and similar facilities are properly maintained and disinfected. In addition, persons with serious health problems should consult their physician before undertaking an exercise program.

Side effects

Side effects may vary, depending on the numerous herbs used in Kneipp therapy. When in doubt, it is best to consult a knowledgeable herbalist.

Research and general acceptance

Initially, Kneipp was rejected as a charlatan by the medical establishment. At one point, he was taken to court for quackery, although the judge acquitted him after learning from Kneipp about the shortage of physicians in Alpine villages. Kneipp is now recognized by naturopaths as a founding father of their discipline. The benefits of water are well-known to physiotherapists, but there is so far little conclusive evidence that Kneipp or other methods of hydrotherapy can increase the body's immunity. One German study published in 1977 found that immunological reactions to protein and bacterial antigens were significantly more intense in patients who had undergone Kneipp hydrotherapy, compared to a group of healthy volunteers. There is little doubt among medical doctors that patients should benefit from the vigorous exercise and **high-fiber diet** included in the Kneipp prescription for wellness.

Training and certification

The world center of Kneipp wellness is the village of Bad Worishofen in the foothills of the Bavarian Alps. There, the Kneipp *Kur* is offered by spas, physicians, and guest houses. Healer training is provided by the Sebastian Kneipp School of Physiotherapy. Elsewhere in the world, many adherents of Kneipp's writings treat themselves by using his techniques.

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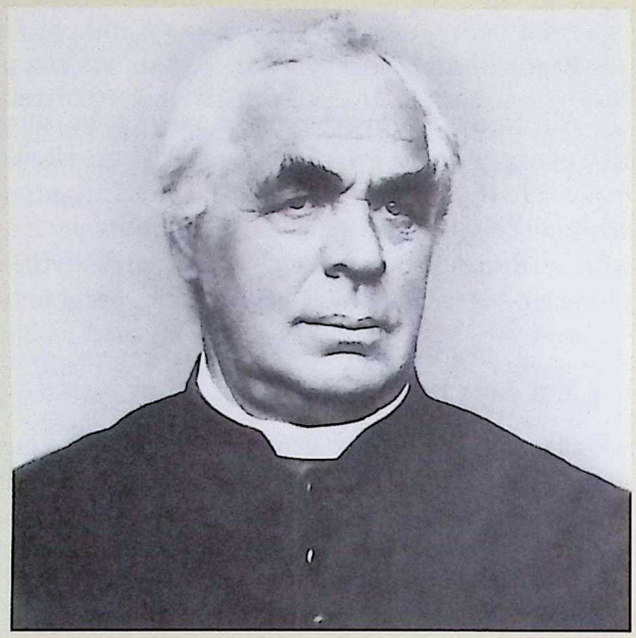
FATHER SEBASTIAN KNEIPP (1821–1897)



(Betmann/CORBIS. Reproduced by permission.)

Born in Stephansreid, Bavaria, Germany, of poor parents, Sebastian Kneipp's childhood was filled with labor, much of it learning weaving from his father. Even as a child, Kneipp wanted to become a priest. With the help of a priest who befriended him, Kneipp entered high school where he studied theology for five years. During this time, he contracted consumption (pulmonary tuberculosis), usually a fatal disease at that time. While ill, he read an eighteenth-century book on hydrotherapy by Dr. Hahn. This caused him to bathe two or three times a week in the icy Danube River to stimulate his immune system. His tuberculosis went into remission, his health improved, and in 1850, he entered a seminary in Munich. He continued his hydrotherapy and convinced other theological students to practice it. Kneipp was ordained a priest in 1852. During the next few years, he was called to the bedsides of many patients to perform the last rites. Instead he successfully treated a number of the patients with hydrotherapy.

He perfected his own system of hydrotherapy and his successful treatment of the poor attracted much attention. People came from throughout Germany to be healed by Kneipp's hydrotherapy. His success fostered resentment from physicians and at one point, he was charged in German courts with quackery, where he was subsequently acquitted. In 1886, he published *My Water Cure*, which was translated into several languages and became popular throughout Europe. He continued to refine his treatment from one of severity to milder versions. It consisted of bathing in and drinking cold water, going to bed and rising early, long barefoot walks in wet grass, and simple meals consisting of little meat and lots of whole grain cereals. He continued his hydrotherapy practice at Wörishofen Monastery in the foothills of the Alps until his death. Kneipp's hydrotherapy is still practiced throughout the world, especially in Germany and the United States.

Resources

ORGANIZATIONS

Kneipp Corporation of America. 105-107 Stonehurst Court. Northvale, NJ 07647. (201) 750-0600 or (800) 937-4372. *http://www.kniepp.com.*

David Helwig

Kola nut

Description

The kola nut, or bitter cola, (*Cola vera, Cola acuminata, Cola nitida*) is a seed part from a tree from the Sterculiaceae family. The trees are native to Central and Western Africa, but are now found in the West Indies and Brazil, where they were introduced by African slaves. All three species are used as a stimulant and are prepared in the same manner. The kola tree grows to approximately 40 ft (12 m) in height, and has white to yellow flowers with spots that range from red to purple. The kola tree's leaves are 6–8 in long (15–20 cm) and the tree bears fruit that is shaped like a star. Inside the fruit, about a dozen round or square seeds can be found in a white seed shell.

General use

Kola nut, which contains high amounts of **caffeine**, helps combat **fatigue** and is most commonly used as a central nervous system stimulant that focuses on the cerebrospinal centers. It also contains theobromine, a stimulant found in chocolate as well as in **green tea**. Kola nut also contains tannins, phenolics, phlobaphens, kola red, betaine, protein, starch, fat, **thiamine**, **riboflavin**, and **niacin**. The *Journal of the American Medical Association* advocates the use of kola over other stimulants, because it is not addictive

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Kola nut plant. *(©PlantaPhile, Germany. Reproduced by permission.)*

and does not lead to **depression**. Because kola nut is also a diuretic, its use has been suggested for those with renal diseases, cardiac or renal **edema** and rheumatic and rheumatoid conditions. Most people around the world are familiar with kola; many have tasted it and do not even know it. In the 1800s, a pharmacist in Georgia took extracts of kola, sugar and coca and mixed them with carbonated water. His accountant tasted it and called it "Coca Cola." Today, Coca-Cola still uses kola in its original recipe.

Respiratory conditions

Kola is widely used as a treatment for **whooping cough** and **asthma**, as the caffeine acts as a bronchodilator, expanding the bronchial air passages. A *Journal of American Medicine* cites a study of kola nut's effects on asthma that showed "the attack being cut short and the child's condition rapidly improved."

Gastrointestinal disorders

In Africa, the fresh nuts are chewed as a ceremonial greeting, as a stimulant, and to help aid digestion, as kola nut stimulates gastric acid production. Kola nuts are also known to improve the taste of food and act as an appetite suppressant.

Other conditions

The kola nut is also used to treat migraine headaches, because the caffeine and theobromine act as cerebral vasodilators (increase blood flow in the head) and, when used in a poultice, can be applied to external **cuts** and scrapes.

More recently, an ephedra/caffeine preparation made from kola nut extract and a Chinese medication known as Ma Huang was tested for safety and efficacy as part of a weight reduction program. The study indicated that the preparation improved the subjects' rate of weight loss and reduction in body fat without undesirable side effects.

The flavor of kola nut in cola beverages appears to be more effective than other flavors in disguising the taste of **activated charcoal** when the charcoal must be given as an antidote for accidental poisoning.

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KEY TERMS

Bronchodilator—A medicine that relaxes the bronchial muscles and opens up the air passages to the lungs.

Cardiac arrythmia—The irregular beating of the heart.

Cotyledon—A seed leaf, from the embryo of a seed plant.

Theobromine—A stimulant that occurs naturally in chocolate as well as in kola nut. Foods and drinks containing theobromine are poisonous to domestic pets.

Vasodilator—A drug or nerve that causes blood vessels to widen.

Preparations

The part of the seed known as the kola nut is the cotyledon, which is also called the seed leaf. The cotyledons are white and bitter when they are fresh, but they turn reddish with almost no taste when they are dried. Fresh nuts are difficult to find outside of the tropical areas where they are grown. Sometimes, the nuts are sold at African markets in international cities, like Washington D.C. The dried cotyledons are 1–2 in (2.5–5 cm) long.

Dosage of kola nut should be 2–6 g per day, as 2.5–7.5 g of liquid extract or 10–30 g per day of tincture. Powdered cotyledons should be taken at 1-3 g per day, as a decoction, liquid extract, or tincture. For the decoction, boil 1-2 teaspoons in a cup of water and take three times a day. The liquid extract should be taken in a 1:1 solution of 60% alcohol at .6-1.2 ml three times a day. Tinctures in a 1:5 solution of 60% alcohol, with 1-4 ml of the cotyledons three times a day.

Precautions

Because of its use as a stimulant, kola nut should be used with caution. Patients should consult with their doctors, especially if they are taking other medications. Due to its caffeine content, kola nut should not be used by women who are pregnant or nursing a child. Also because of its caffeine content, it is not advisable for those suffering from **insomnia** or **anxiety** problems. In some cases, extreme restlessness and sleepnessness can occur. It should not be used by patients with a history of high blood pressure, heart trouble, palpitations, seizures, insomnia, **heart disease**, high **cholesterol**, or **stroke**. Research in Niger showed that the habitual chewing of kola nut can actually cause cardiac arrythmias, based on clinical trials using cats. Kola nut should not be used by those with stomach or duodenal ulcers because it increases gastric juice production and may add to gastrointestinal discomfort and disorders. Kola nut is also one of the top ten common food allergens, among cow's milk and chocolate. Kola nut is naturally very high in tannin, a white-to-yellow astringent powder that gets its name from its use as a textile and leather tanning agent. However, a University of Miami study shows that "tannins are increasingly recognized as dietary carcinogens and as antinutrients interfering with the system's full use of protein" and called for more studies correlating early death and regular kola nut use in third world countries. Kola nut should not be used long-term.

Kola nut and cola beverages should be kept away from dogs, cats, and other domestic animals. The theobromine in kola nut (and in chocolate as well) can be fatal to these pets because they metabolize it much more slowly than humans.

Side effects

Kola nut may cause insomnia, anxiety, nervousness, gastrointestinal problems, and tremors. If there is any indication of an overdose, **diarrhea**, **nausea**, and/or cramps may follow. Oral **blisters** have also been known to form.

Heavy use of kola nut or drinking large quantities of cola beverages has been associated with bone loss in adults and inhibition of bone formation in adolescents. Some practitioners are recommending that teenagers should restrict intake of soft drinks containing cola in order to lower their risk of **osteoporosis** in later life.

Interactions

Kola nut should not be used with muscle relaxants, heart medications, high blood pressure medication, nitrates and calcium-channel blockers.

Clinical experiments indicate that beverages containing cola increase the rate and extent of absorption of carbamazepine (Tegretol), a drug used to treat **epilepsy** and some forms of **bipolar disorder**. Kola nut has been reported to interact with tricyclic antidepressant medications and with MAO inhibitors. In general, patients taking any medication for anxiety or depression should consult their physician before taking preparations containing kola nut.

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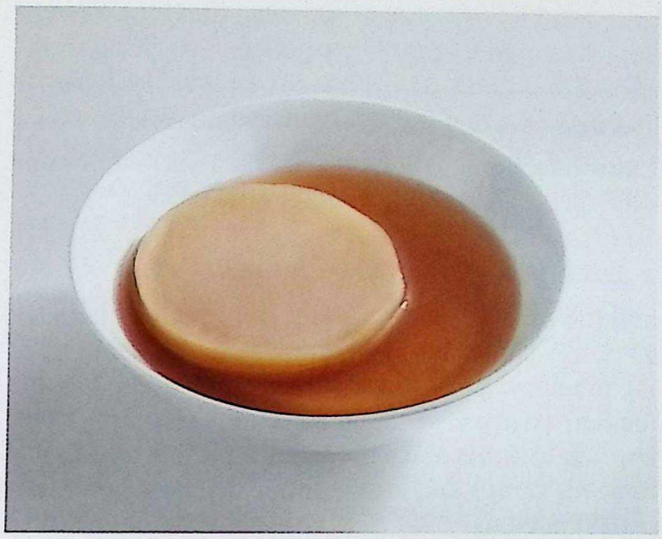
Kombucha

Description

Kombucha is a fermented beverage prepared from a mushroom (*Fungus japonicus*). Known as kombucha tea, the drink is touted for its health-promoting properties. It is also called Manchurian mushroom tea, Manchurian fungus tea, Kwassan, combucha tea, and champagne of life. During fermentation and preparation, the kombucha membrane becomes a tough, gelatinous cover composed of several different yeasts (one-celled fungi) and certain nontoxic bacteria derived from the air, similar to a sourdough bread starter. When the fungus is fermented in a mixture containing water, black or **green tea**, sugar, and vinegar (or other fermentation source), the microorganisms combine into a complex fermenting culture. This culture produces several compounds that have been considered health tonics over the centuries. Kombucha also contains several B vitamins and **vitamin C**. The tea is said to have a unique, pleasant taste. The membrane surface of the kombucha is also edible.



Kombucha tea. *(© Bon Appetit / Alamy)*

In China, kombucha tea has been utilized as a health beverage for thousands of years, dating back to before 200 B.C. It has been consumed for centuries in Japan, Korea, and Russia. In the early 1900s, use of the tea spread from Russia into other European countries including Germany, where it was touted as a health elixir for many years. In the 1950s and 1960s, German and Italian researchers claimed that kombucha tea exhibited strong anticancer properties, and it was promoted as a miracle cure for **cancer**. Alexander Solzhenitzyn, the Nobel Prize winning Russian author, reported that kombucha tea, which he began to drink during a prison term, cured his stomach cancer. Proponents of kombucha tea continue to tout its possible anticancer and immunity-enhancing properties. However, controlled studies have failed to display conclusive evidence as to its efficacy in treating various medical conditions.

General use

Kombucha tea is taken as a general health tonic. Claims are made for its use as a remedy for specific health conditions and diseases. It is used to introduce

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KEY TERMS

Anthrax—A highly toxic strain of bacteria.

Intestinal flora—The beneficial bacteria that live in the digestive tract and aid digestion of food.

and improve healthy intestinal flora and bacteria, as an energy-enhancing tonic, and as a detoxifier in helping to remove pollutants. It is taken to strengthen the immune system after an illness, stimulate hair growth, improve arthritis and skin conditions, and as a health tonic for cancer and autoimmune deficiency syndrom (**AIDS**) patients.

Kombucha tea contains significant amounts of the B complex vitamins, as well as vitamin C and minerals. It contains a small amount of alcohol (higher than 1%), which is produced during fermentation, and small amounts of methylxanthine stimulants. Teas do not contain **caffeine**, but they do contain methylxanthine alkaloids, a similar stimulant.

There is no large body of scientific evidence that supports the strong claims made by advocates of kombucha tea. Some European studies have pointed to positive results in cancer cases, but further research is needed to confirm these results. Its proposed anticancer and **detoxification** effects have been attributed to certain chemicals in the tea. However, more recent tests have failed to validate the presence of these chemicals in the beverage. One study did confirm improvements in liver function after a three-week treatment. Research in Russia demonstrated antibiotic effects caused by kombucha tea. There are many testimonial claims that the tea increases vitality and overall well-being. In general, properly fermented foods have been shown to aid in the growth of beneficial intestinal flora, reduce the growth of harmful yeasts and bacteria in the digestive tract, and improve digestion and absorption. Some testimonial claims have also been made by cancer and AIDS patients.

Preparations

Kombucha tea is available in several forms. Kits include the fungi and all ingredients, as well as directions to make the brew at home. The fungi may also be purchased separately. Dried kombucha is available in capsule form.

Making the tea from scratch is a process similar to preparing yogurt, sauerkraut, and other fermented foods. Instructions should be followed carefully. Particular care should be taken to maintain the cleanliness of the tea-making process, to avoid contamination by mold or unhealthy bacteria (a cause of health problems in those drinking poor quality kombucha). **Smoking** in the same room as the mixture may contaminate it. Mold typically appears as green, pink, or black blotches in the culture, and should be thoroughly removed and discarded. The fermentation process is generally successful if the kombucha skin remains firm and rubbery. Care should be taken if the membrane becomes crumbly or discolored. On average, the fermentation of kombucha tea takes 12–14 days. After fermentation, new batches can be easily made from the existing culture.

When using the supplement in pill form, consumers can follow the manufacturer's recommended dosages. Users of the tea can drink up to three cups of the beverage per day, with food or between meals.

Historically, kombucha was consumed as a tea. The health benefits of other forms of the supplement have not been compared with the original therapeutic beverage. There are reports of consumer illness from home prepared kombucha. This may have been due to tea that was too old, infected with molds or other contaminants, or had other problems. Consumers must be alert to the risks of home prepared fermentation methods.

Precautions

Several precautions concerning kombucha tea have been issued. Because the beverage is fermented at home, there is the risk that the liquid can become contaminated by dangerous bacteria such as anthrax. People with compromised immune systems must be extremely careful not to consume contaminated fermentations. Due to the high acidity of the drink, the tea should not be placed in metal containers or in pottery that has a lead glaze finish. There have been reported cases of **lead poisoning** and anthrax due to drinking kombucha tea that has been improperly prepared. The United States Food and Drug Administration (FDA) issued a warning concerning the danger of lead poisoning from improperly made kombucha tea. Kombucha tea is not recommended for pregnant or nursing mothers.

Side Effects

Consumption of kombucha tea has been observed to cause stomach upset, yeast **infections**, allergic reactions, **nausea**, and **headache**. Persons with stomach ulcers may find that kombucha increases their symptoms. Due to harmful bacteria that can survive in the culture, ingesting contaminated tea can be dangerous or fatal.

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Interactions

Kombucha tea is high in acidity, and should not be consumed by those taking medications that make them susceptible to increased gastrointestinal acidity. The tea contains a small amount of alcohol, and should not be consumed with any medications that interact unfavorably with alcohol. The tea should not be taken by people with stabilized **alcoholism**, to avoid aggravating the condition.

Some people report general and specific improved health from moderate use of kombucha tea. These reports await final validation by current research. There are risks associated with the use of poor quality or contaminated kombucha. Its use may be contraindicated in those who have medical conditions or require certain medications.

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Douglas Dupler

Kudzu

Description

Kudzu, whose botanical name is *Pueraria lobata*, is a member of the Fabaceae legume family. It is also known as Ge-gen, kudzu vine, mile-a-minute vine, foot-a-night vine, and the vine-that-ate-the-South. The latter names refer to this vine's property of rapid growth. This perennial trails, climbs, and winds its rough vines around tree poles and anything else it touches. It grows in shady areas, mountain areas, fields, roadsides and forests in China, Japan, and the southern United States, more so in the latter because when imported, its native insects did not tag along. Kudzu was first seen in the United States as an ornamental plant at the 1876 Philadelphia Centennial Exposition. During the Depression, the United States Department of Agriculture (USDA) imported kudzu for erosion control. In 1972, the USDA classified kudzu as a weed because the plant can reach 60 ft (18.29 m) in a single growing season. In June and July, the vines sport purple flowers and in autumn, the leaves shed.

The kudzu root, which can grow to the size of a human being, has a history of use in Chinese medicine. Kudzu contains daidzein, an isoflavone, and daidzin and puerarin, isoflavone glycosides. The isoflavone amount can range from 1.77–12.08%, based on kudzu's growing conditions. The highest isoflavone is puerarin with daidzin and daidzein next in isoflavone amounts. A study at the University of Michigan compared legumes for their sources of the isoflavones of genistein and daidzein. The results showed the kudzu root as a good nutritional source of those two components.

The root also supports bacteria that grab nitrogen from the atmosphere and put it in the soil. This factor may explain kudzu's rapid growth and its success in feeding Angora goats raised by Tuskegee University researcher Dr. Errol G. Rhoden.

General use

Traditional uses

Traditional Chinese medicine has used kudzu, whose Chinese name is *ge gan*, for centuries. Kudzu's medicinal uses were first recorded in Shen Nong's herbal text, published around A.D. 100. Chinese medicine recommends kudzu for what it calls *wei*, or superficial syndrome, referring to a mild disease that appears just below the body's surface and is accompanied by a **fever**. Chinese medicine also indicates using kudzu for thirst, headaches (migraine and other types of headaches), **neck pain** from **hypertension**, **angina**, **allergies**, **diarrhea**, and speeding the progression of **measles** in children. In general, kudzu is used as a demulcent, or medication given to soothe irritated mucous membranes.

Cardiovascular disease

One alternative practitioner has stated that because kudzu improves the body's flow of blood and levels of oxygen and opens heart vessels, it might help the cardiovascular system. Another researcher, James Duke, refers to a Chinese clinical study that showed that kudzu can benefit angina sufferers. For a period of 1–6 months, 71 participants took 10–15 gm of kudzu root extract. The results indicated that 29 people had significant improvement, 20 had an

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KEY TERMS

Demulcent—A substance or medication given to soothe irritated or inflamed mucous membranes. Kudzu is used as a demulcent in traditional Chinese medicine.

Daidzein—An isoflavone contained in kudzu that appears to be useful in treating alcoholism.

Ethanol—Another name for the alcohol found in alcoholic drinks.

Extract—A concentrated form of the herb made by pressing the herb with a hydraulic press, soaking it in water or alcohol, then allowing the excess water or alcohol to evaporate.

Tincture—A liquid herbal preparation, made by soaking the herb in alcohol or a mixture of alcohol and water.

intermediary amount of improvement, and the remaining 22 showed no improvement or only a slight improvement.

Duke cites another Chinese study showing that kudzu can lower blood pressure. For a period of 2–8 weeks, 52 people drank about 8 tsp of kudzu root in a tea. Seventeen people had their blood pressure decrease substantially, while the other 30 had some relief from hypertension.

Alcoholism

It is the Chinese medicinal use of kudzu in treating **alcoholism**, however, that is the focus of many studies on kudzu. In 1989, two associate research professors in the psychiatry department at the University of North Carolina tested rats for their alcohol cravings. In 1991 an organic chemist tested a tea containing seven herbs including kudzu on drunken rats. The rats had been injected with alcohol; when they ingested the herbal tea, their motor movements became more coordinated.

In further studies conducted in 1992, the rats were allowed to drink alcohol for an hour each day. The rats gulped down an enormous amount of alcohol; however, after a week, when the herbal mixture containing kudzu was given to them 15 minutes before their happy hour, they drank much less alcohol. In another study, the rats were allowed to drink alcohol for the first 24 hours, then deprived for the next 24 hours. On day three, the rats' alcohol intake increased from 20% to 30%. Once injected with the herbal mixture, however, the rats either drank a normal or less than normal amount.

A 1995 study was also conducted at Harvard University using hamsters, because hamsters naturally choose alcohol over water. Thirty hamsters were given either daidzein, an active ingredient in kudzu; or disulfiram (Antabuse), a compound that stops ethanol craving in humans. Nine more hamsters were allowed to drink as much alcohol as they wanted without anything added. Hamsters receiving daidzein dropped their alcohol intake by 70% and those receiving disulfiram had 80% less alcohol intake. The researchers concluded that daidzein takes a less toxic metabolic route than disulfiram.

A double-blind random clinical study using human subjects was conducted at the Veterans' Affairs Medical Center in Prescott, Arizona. Thirty-eight middle-aged men suffering from chronic alcoholism were given either 1.2 g of kudzu root extract (21 men) or 1.2 g of a placebo (17 men) twice daily for a month. The results of this test showed no significant difference in sobriety or alcohol cravings in either group.

Preparations

The problems of manufacturing kudzu root as a drug to treat alcoholism and other disorders were outlined in an article on traditional Chinese medicine by Dr. James Zhou. Zhou says that herbs lose their natural balance when manufacturers purify, refine, and treat them with chemicals. The daidzein in kudzu could treat alcoholism, but the purification process destroys the isoflavone balance. Because it is the isoflavone puerarin in kudzu that stops cardiovascular damage impairment and may prevent an alcoholic side effect, liver damage, Zhou believes that the herb should be given in its natural state.

For angina pectoris, practitioners of traditional Chinese medicine recommend 30–120 mg of standardized tablets of kudzu root two to three times daily. Ten mg of a standardized tablet equals 1.5 g of the pure root. Tinctures of 1–2 ml three to five times daily are recommended in place of tablets. To help lower cravings for alcohol, the recommended dosage is 3–5 g of kudzu root three times daily or 3–4 ml of tincture three times daily. The *All-In-One-Guide to Natural Remedies and Supplements* recommends drinking kudzu tea to combat alcoholism. An alternative form of treatment involves taking 1500-mg supplements or cubes before or after the alcohol. The 1500 mg can be divided equally into three daily doses.

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Kudzu also comes in supplements combined with **St. John's wort** to treat the symptoms of alcoholism. One capsule is taken with each meal on a daily basis.

Kudzu leaves can also be used in cooking, for example in quiches and as a deep-fried dish.

Precautions

Kudzu should not be taken by pregnant and lactating women. In traditional Chinese practice, people who sweat too much or have cold in their stomach should avoid kudzu because it is given for "wind-heat" illnesses.

Side effects

No toxic side effects or damage to the liver have been reported from kudzu.

Interactions

Kudzu should not be taken in conjunction with prescription drugs. As with all medicinal supplements, it is best to check with a health care provider before taking kudzu.

Resources

BOOKS

Ali, Elvis, Dr., et al. *The All-In-One Guide to Natural Remedies and Supplements*. AGES Publications, 2000.

Balch, James F., MD and Phyllis A. Balch, CNC. *Prescription for Nutritional Healing*, 2nd ed. New York: Avery Publishing Group, 1997.

Duke, James A., Ph.D. *The Green Pharmacy*. Emmaus, PA: Rodale Press, 1997.

Sharon Crawford

L-Arginine *see* **Arginine**

L-Carnitine *see* **Carnitine**

L-Glutamine *see* **Glutamine**

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ISBN-13: 978-1-4144-4874-9
ISBN-10: 1-4144-4874-0
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